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From Start to Zero: The Initiation of Zero Waste Planning in Teton County, Wyoming

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From Start to Zero: The Initiation of Zero Waste Planning in Teton County, Wyoming

by

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Abstract

From Start to Zero: The Initiation of Zero Waste Planning in Teton County, Wyoming

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The University of Texas at Austin, 2015

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In the following report, I explore the emerging discipline of zero waste as it applies to municipal solid waste management. My aim in this exploration was to assist the community of Teton County, Wyoming in its pioneering effort to draft a municipal zero waste plan of action. As I will explain, the reference points for a community undertaking the initial steps toward zero waste are varied. My research coupled internal data from County solid waste operations with information from external sources, including solid waste experts, zero waste plans from comparable communities, and prevailing literature regarding zero waste planning and plan evaluation. As a result, I provide an explanation of the context in which Teton County will formulate an approach toward zero waste as well as a framework by which to compare zero waste planning in Teton County with efforts in other communities. The material presented will ultimately serve as a resource for the development of strategic recommendations in the initial draft of the 2015 Teton County zero waste plan.

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Chapter 1: Introduction

In the following report, I explore the emerging discipline of zero waste as it applies to municipal solid waste management. My aim in this exploration was to assist the community of Teton County, Wyoming in its pioneering effort to draft a municipal zero waste plan of action. As I will explain, the reference points for a community undertaking the initial steps toward zero waste are varied. My research coupled internal data from County solid waste operations with information from external sources, including solid waste experts, zero waste plans from comparable communities, and prevailing literature regarding zero waste planning and plan evaluation. As a result, I provide an explanation of the context in which Teton County will formulate an approach toward zero waste as well as a framework by which to compare zero waste planning in Teton County with efforts in other communities. The material presented will ultimately serve as a resource for the development of strategic recommendations in the initial draft of the 2015 Teton County zero waste plan.

1.1 Overview of zero waste and zero waste planning

Although the term, zero waste, is increasingly recognized within the United States and throughout the world, there exists no standard definition nor certified methodology. The definition considered an unofficial touchstone, most frequently referenced and informally peer reviewed, is provided by the Zero Waste International Alliance. The ZWIA is a non-profit advocacy and information organization, initiated by Richard Anthony, which facilitated the conceptualization and evolution of zero waste over the past decade.[1] The ZWIA definition of zero waste is as follows:

[1] "ZWIA History," Zero Waste International Alliance, accessed June 3, 2014, http://zwia.org/aboutus/zwia-history/.

> Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.
>
> Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.
>
> Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.[2]

As it pertains to municipalities, zero waste planning can be described as an effort to "transform [cities'] current waste management practice into a more efficient and sustainable way, called zero waste practice."[3] Zaman and Lehmann further explain the overall goals of municipal solid waste management as needing to address: waste collection; waste minimization; reuse and recycling promotion; monitoring and motivating through awareness, recognition, incentives and penalties.[4]

There are approximately thirty cities and counties throughout the United States that have approved zero waste plans for their communities.[5] Numerous others are either in the process of developing plans for future adoption or, are incorporating aspects of zero waste planning into other environmental or sustainability oriented agendas.[6] The majority of these municipalities represent large, urban, industrialized communities with

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2 "ZW Definition," Zero Waste International Alliance, accessed January 23, 2014, http://zwia.org/standards/zw-definition/.

3 Zaman, Atiq Uz, and Steffen Lehmann. "Urban Growth and Waste Management Optimization towards 'zero waste city'." *City, Culture and Society* 2 (2011): 177.

4 Zaman and Lehmann, "Urban Growth and Waste Management," 178.

5 "County adopts 'zero waste resolution' to promote less dumping," Jackson Hole News and Guide. September 18, 2014. http://www.jhnewsandguide.com/news/town_county/county-adopts-zero-waste-resolution-to-promote-less-dumping/article_87afe3d1-095e-5fe9-baf7-94d65a98db6f.html; "Zero Waste around the World." Zero Waste around the World. Accessed September 26, 2014. http://www.ecocycle.org/zerowaste/aroundtheworld.

6 Dattaro, Laura, "Zero Waste Zones: 10 Cities Getting Rid of Garbage," Weather.com, April 1, 2014, http://www.weather.com/science/environment/earth-day/news/zero-waste-zones-10-cities-getting-rid-garbage-20140401#/1

geographic proximity and access to national and international markets.[7] The significant volumes of waste produced in these communities as well as the existing infrastructure for solid waste management point to them as logical places of origin for the groundswell of zero waste initiatives.

1.2 Overview of zero waste planning in Teton County

As a small, rural, geographically isolated community, Teton County is a unique contender among zero waste leaders. The initiation of zero waste planning in Teton County is the first and only effort of its kind in the state of Wyoming. The novelty of this effort, however, is not confined within the borders of the state, and neither is the disposal of solid waste. While open space in Wyoming is plentiful, approximately 97% of Teton County is made up of environmentally protected public land. As a result of this major effort in land conservation, waste from Teton County in recent decades has been disposed of in a number of regional landfills. Current disposal takes place 100 miles away in neighboring Bonneville County, Idaho.

In September 2014, the Teton County Board of Commissioners passed a resolution to adopt zero waste as a guiding principle and support the creation of a zero waste plan. It is this plan that will solidify Teton County as significant among U.S. cities undertaking an approach to zero waste. In addition to being first in Wyoming, Teton County will be a leader on the national scale for zero waste planning in small, rural communities with a population below 25,000. It is for this reason that the zero waste planning process in Teton County is worthy of examination.

Analysis of zero waste planning in Teton County will provide insight into this aspect of zero waste planning that is minimally addressed in existing research. The investigation will focus on the strategic recommendations selected for inclusion in the

[7] Dattaro, "Zero Waste Zones."; Ferry, David, "The Urban Quest for Zero Waste," *Wall Street Journal*, September 12, 2011, http://www.wsj.com/articles/SB10001424053111904583204576542233226922972

initial draft of the plan as well as the prioritization of these recommendations into a timeline for implementation. Guidelines for the analysis of strategic recommendations within a zero waste plan are derived from research completed by Zaman and Lehmann in 2011.

1.3 RESEARCH QUESTIONS AND HYPOTHESIS

Zaman and Lehmann identify five aspects of a community that exert influence over zero waste planning. These five categories, or "spheres," are environmental concern, social behavior, politics, economics, and technology. In the hypothesis for this study, I addressed the degree to which the strategic recommendations incorporated into the Teton County Zero Waste Plan would emphasize each of the five spheres. I expected that zero waste planning in Teton County would reflect a fundamental environmental initiative as well as an emphasis on the expansion of social, economic, and technological aspects of solid waste management. I further anticipated that political, or regulatory, planning would receive minimal emphasis as the infrastructure and systems necessary to support and enforce mandatory diversion practices are not yet in place. Finally, I proposed that prioritization of the recommendations would be on the basis of applicability, affordability, and effectiveness, with future goals for alignment with County regulatory structure.

The following chapters address the elements of this hypothesis and reveal both the areas of emphasis and eventual prioritization of recommendations for the 2015 Teton County zero waste recommendations.

1.4 REPORT OUTLINE

Initially, chapter two provides historical as well as current data and context for solid waste operations in Teton County. This chapter provides a reference point from which to understand the progression toward zero waste. Chapter three examines the

external as well as internal influences on the evolution of zero waste thinking in Teton County and chronicles the steps from earliest mention to adoption of a County resolution. Chapter four presents an analysis of comparable municipal zero waste plans and examines the emphasis of pertaining strategic recommendations on each of the five spheres of influence – environmental, social, political, economic, and technological. Chapter five explains the compilation of information from previous chapters into early drafts of strategic zero waste recommendations for Teton County. Chapter six details the current draft of the Teton County zero waste plan and completes the comparison of planning emphasis with other municipal plans from Chapter four. Finally, chapter seven offers concluding remarks on existing and future strategies for zero waste planning.

Chapter 2: Municipal Solid Waste Management in Teton County

Municipal solid waste management in Teton County is on the verge of facing significant challenges, as well as opportunities. Historical operations are nearing the end of an era with the closure and remediation of an antiquated landfill. Future operations are envisioned with innovative design and a sense of responsibility for the future of the community. The following description of past and present municipal solid waste data and operations provides a basis for my understanding of the progression from current conditions to the future of materials management in Teton County.

2.1 Solid Waste Management Operations

Integrated Solid Waste Management and Recycling (ISWR)

Solid waste management in Teton County is overseen by Integrated Solid Waste and Recycling (ISWR). This organization provides solid waste and recycling services to approximately 22,268 residents of Teton County, including the Town of Jackson, Wyoming.[8] As an enterprise fund of the County, ISWR receives no public funding. Current revenue from transfer station tip fees as well as from the sale of recyclables is adequate to fund operations. Going forward, changes to solid waste operations in the approach toward zero waste will require significant adjustment to the financial structure of solid waste operations. I will further address the economic implications of zero waste planning in upcoming chapters.

Solid Waste Programs and Facilities

Landfill

Since the 1950's, solid waste from Teton County has been disposed of in a number of local as well as regional landfills. From 1950 to 1989, the Horsethief Canyon

[8] "Quick Facts," U.S. Census Bureau, accessed March 2, 2015, http://quickfacts.census.gov/qfd/states/56/56039.html

Landfill, located on forty acres, approximately five miles south of the Town of Jackson, was used as the municipal disposal site for solid waste. By 1989, the growing volume of trash disposal as well as changing environmental regulations prevented continued use of this landfill site. Locating an alternative local landfill site proved difficult due to high land prices, land use regulations, and public concern.[9] It was decided, therefore, that the Horsethief Canyon site would be converted into a trash transfer facility. Solid waste from Teton County would be transported to a landfill in Sublette County, Wyoming, 125 miles to the south. This continued until 2012 when transport was shifted to a landfill in Bonneville County, Idaho, 100 miles to the southwest. Landfill tip fees are $110/ton with price incentives for sorted materials. Waste hauling is provided by three private entities serving 95% of Teton County households.[10] Electronic and household hazardous wastes are both banned from disposal at the trash transfer facility.

Closure and remediation of the Horsethief Canyon Landfill is underway. The landfill was constructed without a lining. Contaminated leakage has been identified at the site. A cap and environmental monitoring system are required by state law to be completed by August 2017. Additional facility upgrades at the Horsethief Canyon site will include scale house improvements and expansion of current compost operations and programs. Completion of facility improvements is scheduled for 2020. As I discuss in later chapters, these expanded facilities and operations are a vital component of Teton County's future solid waste management operations, including the goal of approaching zero waste.[11]

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[9] "Landfill Closure Update," Teton County Integrated Solid Waste and Recycling, accessed September 14, 2014, http://www.tetonwyo.org/recycl/topics/landfill-closure-update/252873/

[10] "General Information," Teton County Integrated Solid Waste and Recycling, accessed September 14, 2014, http://www.tetonwyo.org/recycl/topics/general-information/252047/

[11] "Landfill Closure Update," Teton County Integrated Solid Waste and Recycling, accessed September 14, 2014, http://www.tetonwyo.org/recycl/topics/landfill-closure-update/252873/

Recycling

The majority of recyclables are collected through voluntary source-separated drop-off sites. Limited curbside collection is provided by Jackson Curbside Recycling, a private entity that serves mainly commercial customers. Materials are processed, including de-contamination and baling, in a 14,000 square foot materials recovery facility (MRF) that also serves as a storage area for bales pending sale. Materials are shipped to markets around the U.S. Effort is made to limit transport distances and ship primarily within the Rocky Mountain and West Coast regions.[12]

Additional recycling services include confidential document shredding as well as commercial cardboard collection and recycling. Electronics recycling is accepted as well and is particularly significant because disposal of electronics is banned from the trash transfer facility.

The expansion of recycling operations, including additional storage capacity and enhanced sorting capability, will be a necessary component of increased materials recovery in the approach toward zero waste.[13] I will address strategies for increased recycling in the discussion of zero waste recommendations.

Compost

Compost operations for non-food organics, including grass, leaves, branches, trees, shrubs, brush and manure are available through a private entity, Terra Firma Organics. Static piles are used in a two-year process to compost organic materials into marketable mulch.[14]

Expansion of compost operations, including the acceptance of food waste, is integral to the achievement of zero waste. The strategic recommendations included in the

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[12] Personal communication with Teton County ISWR staff, June 6, 2014.

[13] Adams, Laurie. *Conceptual MRF Sizing & Cost Analysis*. Denver, CO: LBA Associates, Inc., 2014; Skumatz Economic Research Associates, Inc., "Jackson Community Recycling Long Range Plan," January 2010.

[14] Terra Firma Organics, http://www.terrafirmaorganics.com, accessed December 3, 2014.

zero waste plan reflect future composting needs as well as the associated preliminary measures. Possible barriers to operational expansion include limited space at the trash transfer station and lack of access to water and electricity.

Household Hazardous Waste

The disposal of household hazardous waste is prohibited from the landfill. These materials are accepted at the recycling center by appointment-only between the months of April and October.

2.2 SOLID WASTE DATA

The following graph illustrates the generation of solid waste with respect to population growth since 1990. The population has doubled from near 11,000 in 1990 to over 22,000 in 2014.[15] Annual solid waste generation has followed a similar trend, increasing from just over 18,000 tons in 1990 to more than 38,000 in 2014.[16] Additional fluctuations in solid waste disposal, not attributed to population changes, are reflective of economic conditions and the resulting effects on consumption, as well as increased travel and tourism to the area.[17]

[15] "Quick Facts," U.S. Census Bureau, accessed March 2, 2015, http://quickfacts.census.gov/qfd/states/56/56039.html

[16] Internal solid waste data provided by Teton County ISWR. See Appendix G.

[17] Van Haaren, Rob, Nickolas Themelis, and Nora Goldstein, "The State of Garbage in America," BioCycle, October 2010, 51(10):16, http://www.biocycle.net/2010/10/26/the-state-of-garbage-in-america-4/

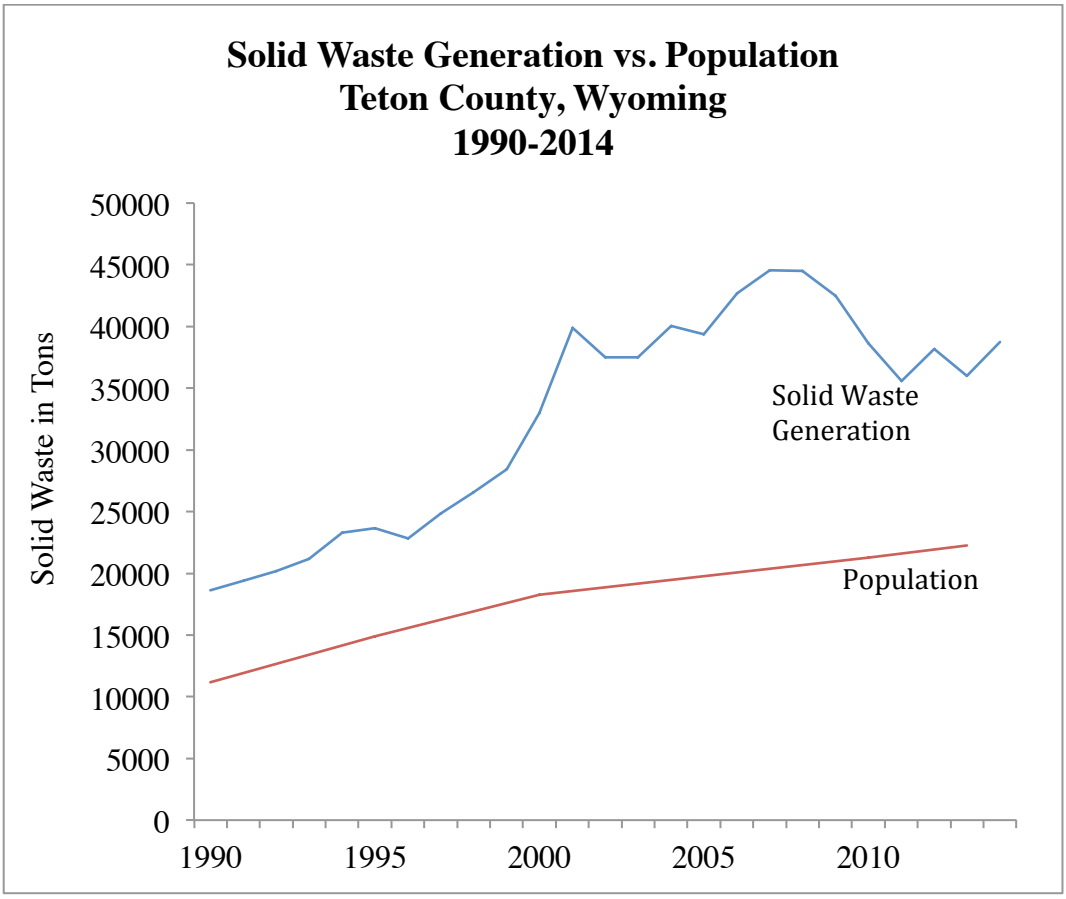

Figure 2.1: Solid waste generation in comparison with population growth in Teton County from 1990 to 2014.[18]

Beginning in 1995, Teton County started to divert certain materials from the solid waste stream for recycling and reuse. Composting of wood and non-food organics began in 2001. Figures 2.2 to 2.5, below, represent the diversion rate from 1990 to 2014 as well as an illustration of itemized diversion by material. The pattern of the amount of material diverted from landfill through recycling, reuse, and composting generally follows the increase and decrease of solid waste generation, with a leveling off of material diversion after 2010. Ideally, as envisioned in an approach toward zero waste, material diversion

[18] Internal solid waste data provided by Teton County ISWR. See Appendix G.

rates would continue to increase over time. This would indicate that an increasing percentage of solid waste was being diverted through material recovery operations.

The stall in diversion rates, between 30-40% since 2010, suggests that County programs, operations and facilities aimed at material diversion may have reached capacity. Diversion beyond this range will likely require additional planning, infrastructure and operations. It is these planning, infrastructure and operational needs that form the basis for my discussion of zero waste in later chapters.

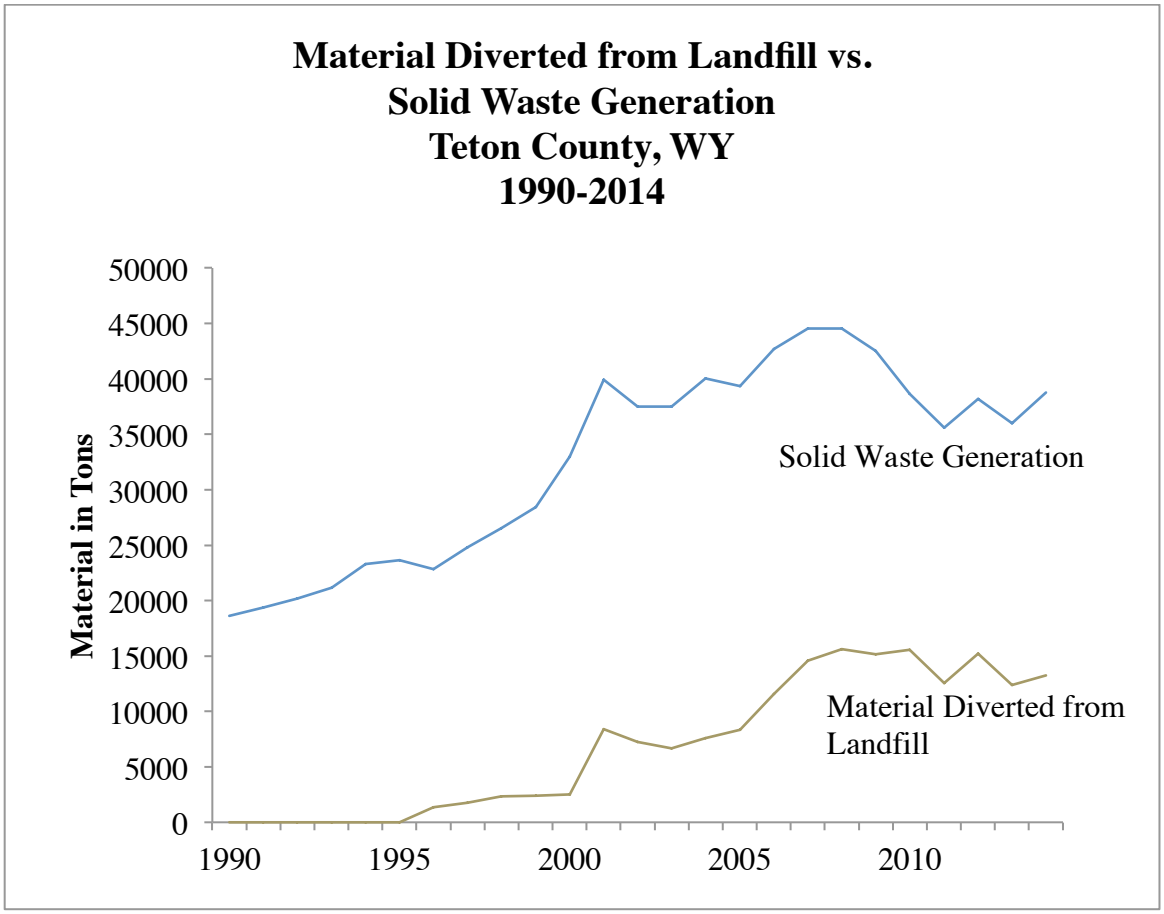

Figure 2.2: The amount of total material diverted from landfill follows a similar pattern to the amount of solid waste generated.

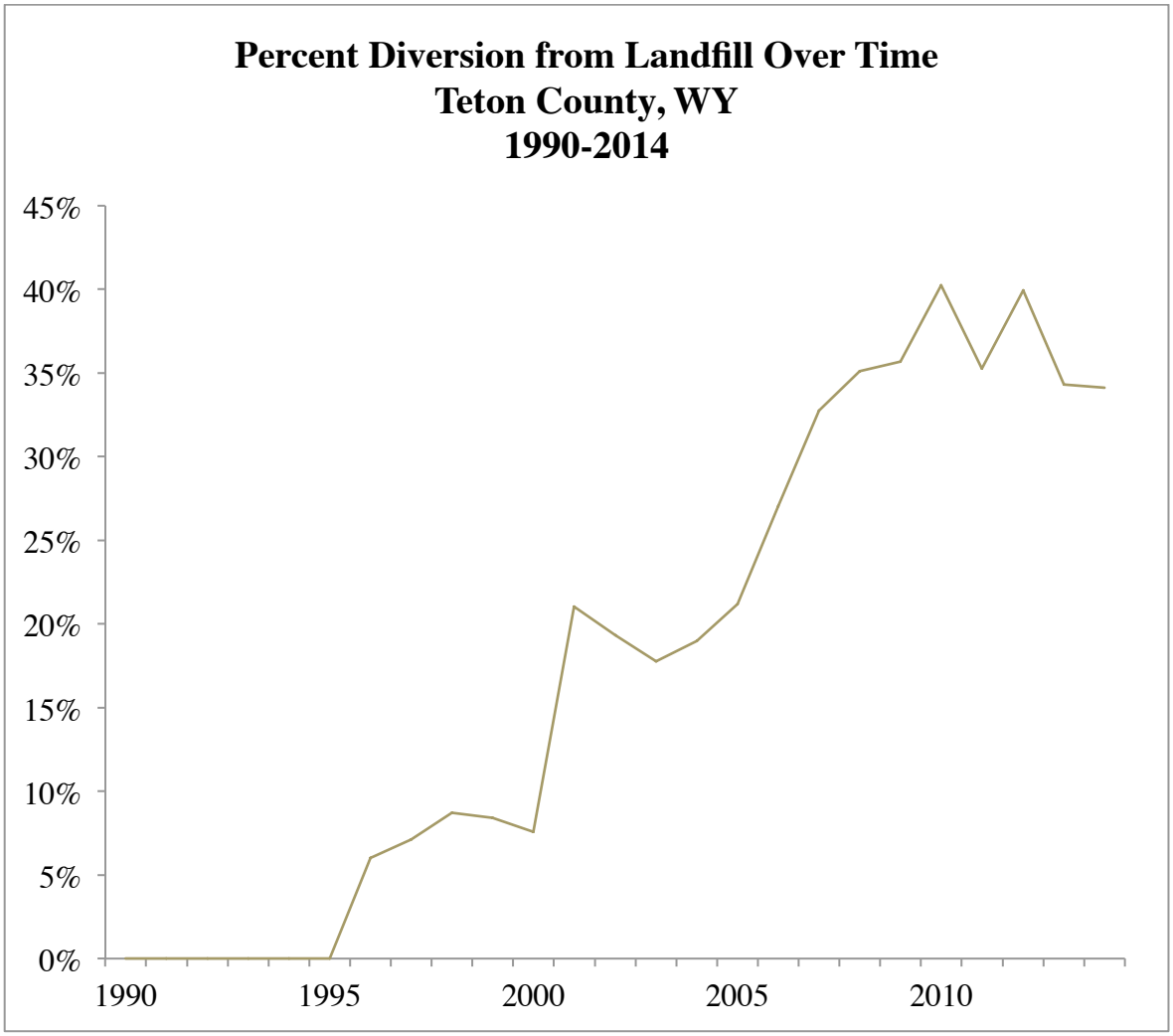

Figure 2.3: The percentage of total material diverted from landfill rose from 0% prior to 1995 to near 40% in 2010 and is recorded at 34% as of 2014. Initial acceptance of recyclable materials began in 1995. Composting of non-food waste organics began in 2000.[19]

[19] Internal solid waste data provided by Teton County ISWR. See Appendix G.

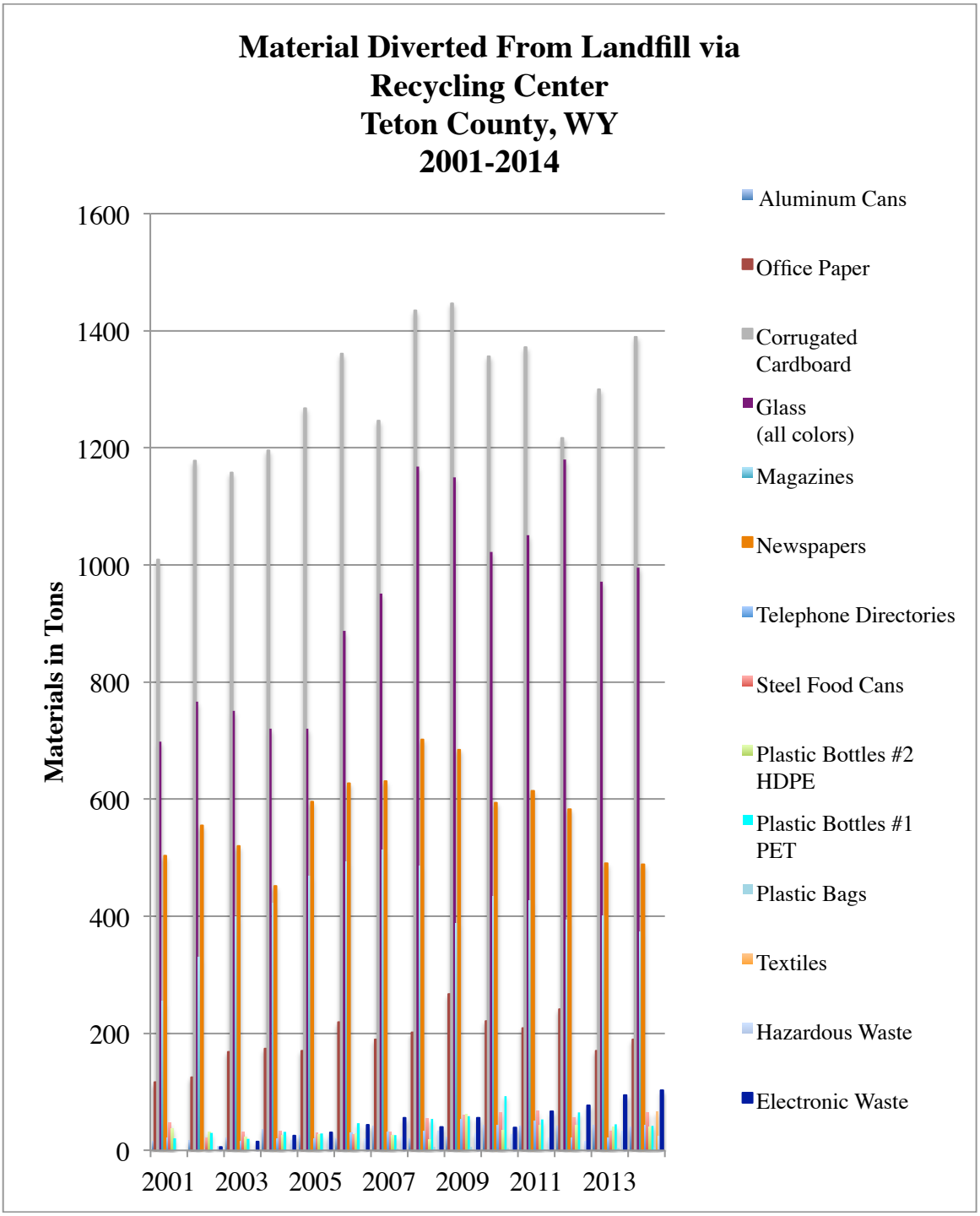

Figure 2.4: Tons of individual materials diverted from landfill via the Teton County recycling center between 2001 to 2014.[20]

[20] Internal solid waste data provided by Teton County ISWR. See Appendix G.

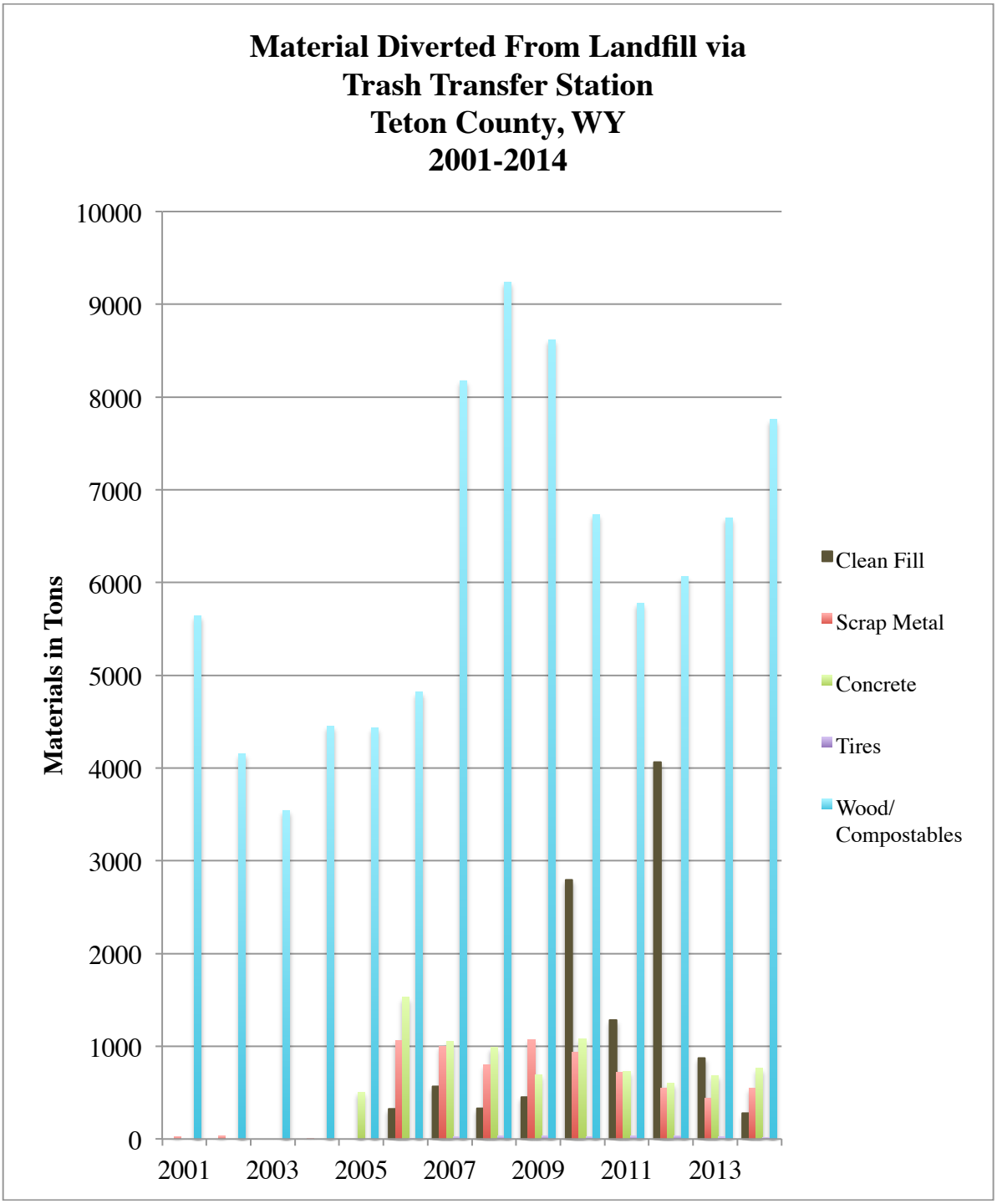

Figure 2.5: Tons of individual materials diverted from landfill via the Teton County trash transfer station for recycling and composting between 2001 and 2014.[21]

[21] Internal solid waste data provided by Teton County ISWR. See Appendix G.

As shown in Figure 2.4, the largest tonnage of material diverted from landfill for recycling between 2001 and 2014 consisted of corrugated cardboard, glass, newspapers, and office paper. As seen in Figure 2.5, the majority of material diverted via operations at the trash transfer station was compostable wood. Current composting operations accept only wood and yard waste. Food waste composting is not currently operational but is included as a long-term recommendation in the current draft of the zero waste plan.

A final chart, Figure 2.6 below, combines Figures 2.4 and 2.5 to summarize the percentage by weight of categories of material diverted from the landfill in Teton County. The majority of diverted material is composed of yard trimmings, standard recyclables, and ground lumber. The remaining recovered material includes concrete and scrap metal. The category of "Other" refers to items such as household hazardous waste and tires. These percentages are an indication of material currently accepted for recovery in Teton County. The County's initial zero waste strategies, discussed in subsequent chapters, reflect these trends in material volumes and address the need for capacity and operations to accommodate material specific landfill diversion.

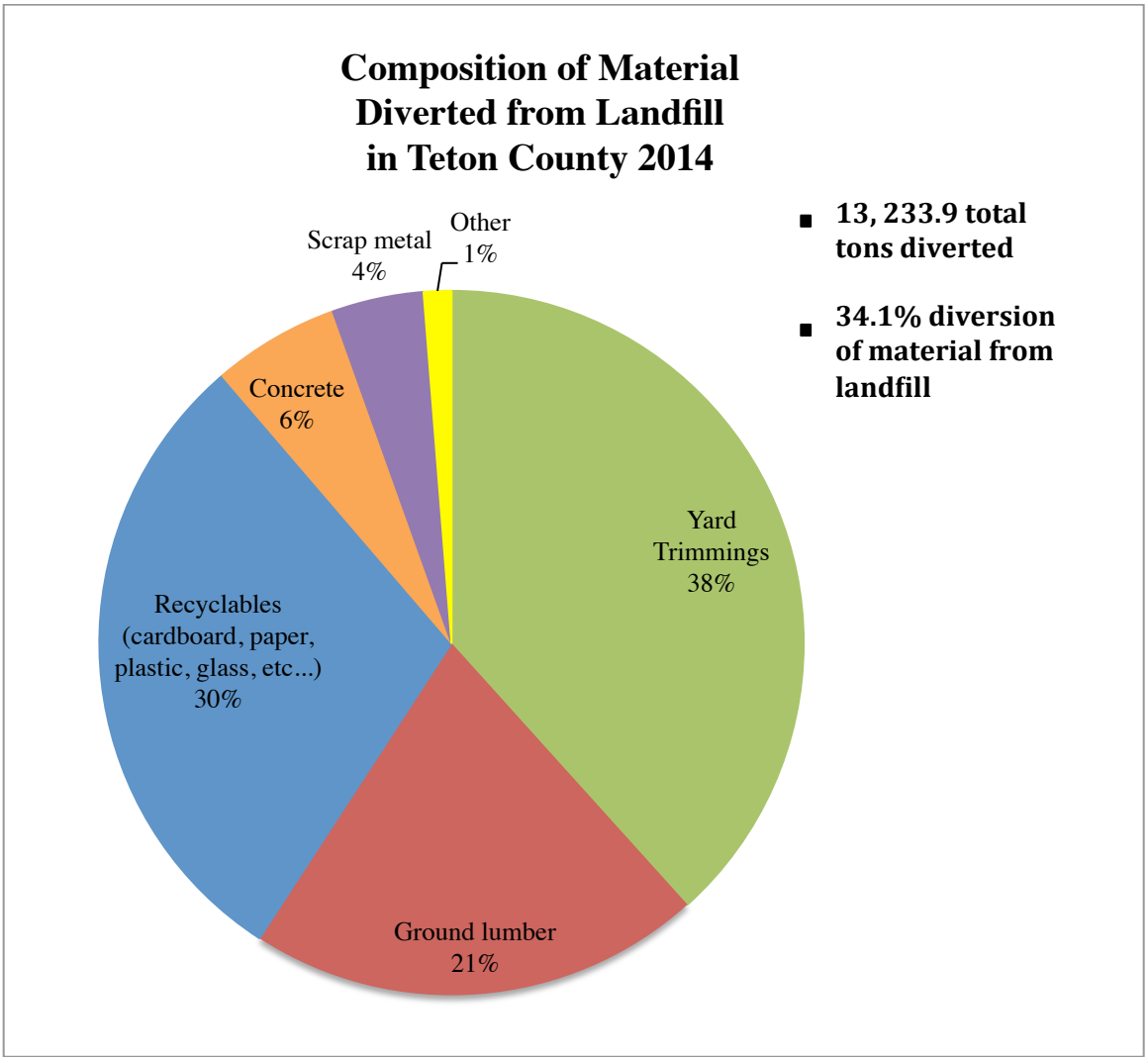

Figure 2.6: Indicates the percent composition by weight of material diverted from landfill. This information is useful in directing strategies to approach zero waste.[22]

It is important to note that the percentages represented here indicate only the types of material accepted as well as the amounts that have been recovered. They do not provide information on recovery as a percentage of generation. Additional data on recovery as a percentage of amounts generated could be achieved through a detailed waste audit and analysis. At this time, however, a waste audit of Teton County has not

[22] Internal solid waste data provided by Teton County ISWR. See Appendix G.

been performed. In the absence of measured data on material generation, estimates can be derived from data provided by the Environmental Protection Agency Facts and Figures report.[23] I will discuss the use of this data for calculations further in Chapter 6.

[23] United States Environmental Protection Agency, "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2011." Accessed January 2014, http://www.epa.gov/solidwaste/nonhaz/municipal/pubs/2012_msw_fs.pdf

Chapter 3: Consultants and Committees

The remaining chapters of this report are derived from my experience over the past year as a volunteer for the Zero Waste Committee of the ISWR Advisory Board. I contacted ISWR staff in the spring of 2014 in advance of my family's relocation to Teton County. I was in search of a local research project to serve as the subject for my master's professional report. In this capacity, I have had the opportunity to converse with numerous staff, Board, and community members; attend meetings; obtain internal data and reports; and study first-hand the evolution and incorporation of zero waste ideas into Teton County solid waste planning. The following is an account of my observations and experiences.

The development of zero waste thinking in Teton County has taken shape with input from external as well as internal influences. Over the past several years, information was sought from experts, consultants, staff, Advisory Board members and volunteers. Further processing and deliberation took place within focused committees, each tasked with individual components of the larger zero waste agenda. In this chapter, I provide additional detail on the development of the zero waste concept within the context of Teton County solid waste management. I chart progress from introductory mention through community collaboration and, finally, to approval of a resolution by the Teton County Board of County Commissioners.

3.1 External Influences

Reports from two consulting firms contributed to the considerations for zero waste planning in Teton County. The first, titled *Jackson Community Recycling Long Rang Plan,* was prepared by Skumatz Economic Research Associates, Inc. (SERA) in 2010. The goals of this analysis included an examination of waste management;

exploration of additional diversion strategies; and a delineation of strategies into near and long-term implementation options. The result was a list of 25 recommendations, spanning a five-year period, to achieve an additional 19-25% increase in waste diversion.[24] Although zero waste was considered to be "beyond the scope of this project," the recommendations put forth provided a starting point from which zero waste plan strategies would emerge.[25]

A listing of strengths and opportunities pertaining to solid waste operations, also provided in the SERA report, aided in explaining the context of Teton County solid waste operations at the beginning stages of zero waste consideration. Table 3.1 is an adaptation of that list. These items established the primary foundation upon which we began to construct the zero waste plan. They served as a summary of existing conditions as well as the basis for additional programs, incentives, and regulations included in the strategic recommendations of the current plan draft.

[24] Skumatz, "Jackson Community Recycling Long Range Plan," 13.
[25] Skumatz, "Jackson Community Recycling Long Range Plan," 13.

Strengths	Opportunities
Strong green ethos among County residents, businesses, leaders. Well developed recycling center operations and multiple drop-off areas throughout Jackson and Teton County. Clean recycling streams that allow higher per ton revenues and continued markets during economic down turns. HHW site and ability to accept harder to recycle materials including plastic bags and electronics waste. Composting area and drop-off located a the transfer station. Well developed education and outreach programs. High landfill-bound MSW tip fees. Tiered tip fees to incentivize materials sorting. An established private curbside recycler offering residential and commercial services.	Pay As You Throw Financing and other rate incentives for diversion of materials. Curbside Recycling Programs. Food Waste Composting. Curbside organics collection. Mixed stream recycling collection for residential and multi-family customers. Expanded commercial recycling. Increased residential yard waste diversion. Expanded land, space and sorting capability at recycling center. Enhanced operations at compost facility including additional space and access to water and electricity. Regulation of solid waste and recycling hauling services. Cost efficiency and storage capacity for e-waste materials. Regulation and incentives for C&D materials diversion.

Source: Skumatz, "Jackson Community Recycling Long Range Plan."[26]

Table 3.1: A summary of strengths and opportunities related to zero waste, adapted from Skumatz Economic Research Associates, Inc.

[26] Skumatz, "Jackson Community Recycling Long Range Plan," 1.

As this table illustrates, Teton County demonstrated a vibrant ethos and promising outreach capability with regard to waste reduction awareness and voluntary drop-off recycling practices. It had also implemented preliminary regulatory measures with a graduated tip fee structure to incentivize waste minimization. The opportunities for advancement toward zero waste included expansion of facilities and services as well as increased regulation. This list of opportunities is reflected heavily in the current draft of zero waste recommendations.

A second consulting report, *Conceptual MRF Sizing and Cost Analysis,* was compiled by LBA Associates in 2014. The purpose of this analysis was to examine current operations of the Teton County materials recovery facility (MRF) and feasibility of enhanced processing of recyclables.[27] Examples included co-mingled streams and regional recycling services. The report particularly addressed potential costs and revenue related to these upgrades. The conclusions of this report anticipate measurable increases in landfill diversion, up to double current levels, with acceptance of a co-mingled stream, either single or dual.[28] Glass is recommended to be source separated in both scenarios. Dual stream requires separation of paper, and single stream does not.

As far as enhancements to the MRF facility, the LBA report recommended expansion of the current facility rather than alternative siting. It further suggested the possibility that regional service, encompassing a four-county area, may offer the most financially feasible route to expansion. The report advised that attention be given to (1) the need to examine hauler and collection logistics in order to implement enhanced collection and processing of recyclables and (2) a call for improved projections on County waste composition and diversion assumptions through pilot studies. As with the

[27] Adams, Laurie. *Conceptual MRF Sizing & Cost Analysis*. Denver, CO: LBA Associates, Inc., 2014
[28] Adams, Laurie. *Conceptual MRF Sizing & Cost Analysis*. Denver, CO: LBA Associates, Inc., 2014

reports from SERA, these recommendations contributed to subsequent zero waste considerations as well.

In 2012, Eric Lombardi, then director of Eco-Cycle, the organization responsible for zero waste initiatives in Boulder, Colorado, made a presentation as part of a sustainability lecture series in Jackson, Wyoming. The audience included local government officials, solid waste stakeholders, and sustainability minded citizens. Mr. Lombardi's presentation described the concept of an approach toward zero waste. It referenced 90% waste diversion as the ZWIA benchmark and outlined a suggested ten-year process for a community to achieve this level of waste diversion. Highlights of the process included a resolution and diversion goal, universal curbside collection, organics separation, pay-as-you-throw (PAYT), increased construction and demolition (C&D) diversion, and numerous methods of expanded participation by residents, businesses, and local government.[29]

Momentum from the influx of zero waste information carried over effectively into the actions and attitudes of participants internal to County solid waste operations.

3.2 INTERNAL MOMENTUM

The integration of external information concerning zero waste was evident over the course of 2013 and 2014. The following list, identified as zero waste "big ideas and concepts," is extracted from a staff report to the ISWR Advisory Board in February of 2014:

Pay As You Throw

Glass recycling improvements

[29] Lombardi, Eric, "A 10-Year Bridge Strategy to Build a Zero Waste Community" Sustainability Series presentation, Jackson, Wyoming, March 21, 2013.

Sorting station at recycling center

Comingled recycling

Economic model for expanded waste diversion

Food waste composting

Expanded textiles program

Collection of old corrugated cardboard from high volume generators

Waste audit

Community survey

Book recycling.[30]

The evolution of these general concepts into zero waste planning elements was driven by ISWR staff and advisory board members. Early steps included the selection of a Zero Waste Planning Committee. Together with ISWR staff, the committee engaged in research, including conference and webinar attendance as well as investigation into zero waste planning initiatives in other communities. Through the course of 2014, additional committee divisions were instituted in order to focus on more specific initiatives, such as composting. From these efforts, a zero waste resolution was drafted and presented to the Board of County Commissioners in September of 2014.

3.3 TETON COUNTY ZERO WASTE RESOLUTION

The Resolution *Adopting Zero Waste as a Guiding Principle and Supporting the Creation of a Zero Waste Plan* was approved by the Board of County Commissioners in September 2014. It identifies the "zero" in zero waste as a conceptual ideal rather than a hard target and explains the aim of a zero waste approach as a change in the way

[30] Staff Report for ISWR Advisory Board, February 28, 2014

materials flow through society.[31] Similar to resolutions from other zero waste communities, mention is made of the "highest and best use of resources." Reference to the ZWIA definition is given with the inclusion of ethical, economical, and sustainable use of natural resources.[32] The guiding principles of zero waste in Teton County are listed as:

managing resources instead of waste;

conserving natural resources through waste prevention and recycling;

turning discarded resources into jobs and new products instead of trash;

promoting products and materials that are durable and recyclable;

discouraging products and materials that can only become trash after their use;

using education as a tool to maximize community engagement.

The resolution also points out the opportunity for government to lead by example in adopting zero waste as a guiding principle and setting the standard for acceptance by the larger community. The possibility of the need for future capital investment in zero waste facilities and infrastructure is included. And, finally, the resolution calls for the creation of a zero waste plan to detail the actions necessary to achieve 60% waste diversion by the year 2030.[33]

With approval and adoption of the resolution, Teton County ISWR was tasked with the development of a zero waste plan. Work continues on this plan. Presentation of the strategic recommendations to the Board of County Commissioners is scheduled for July 2015.

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[31] Teton County, Wyoming, "A Resolution Adopting Zero Waste as a Guiding Principle and Supporting the Creation of a Zero Waste Plan." Teton County, WY: September 16, 2014.

[32] "ZW Definition," Zero Waste International Alliance, accessed January 23, 2014, http://zwia.org/standards/zw-definition/.

[33] Teton County, Zero Waste Resolution, 2014

The external influences discussed in this chapter provided the foundation for the strategic recommendations included in the current draft of the zero waste plan. The original identification of strengths and opportunities in the SERA report as well as the recycling potential outlined by LBA Associates and ten-year checklist from Eric Lombardi feature heavily in the evolution of strategies included in the draft plan.

Internal influences, including staff, Board, and community members, provided the application and customization of this external information to existing solid waste conditions in Teton County. I will describe the details of the incorporation of these influences in upcoming chapters. In chapter 4, I profile zero waste plans from comparable communities in an effort to display varying emphasis on ways in which other communities have optimized zero waste methods for their planning needs. In chapter 5, I reveal the amassing of external, internal, and comparative information into early drafts of the zero waste plan.

Chapter 4: Comparison of Zero Waste Plans from Comparable Communities

One of my tasks as a volunteer researcher was to compare existing zero waste plans from comparable communities. I began by searching for similarities in population size, geographic location, and stage of zero waste planning. Given the unique demographics and geography of Teton County, however, very few communities with a published zero waste plan were determined to have identical, or even similar, characteristics.

In the absence of identical communities for comparison, the search criteria was expanded to include, first, regional proximity. Three existing zero waste plans were found within the Rocky Mountain West region – Boulder, Colorado; Fort Collins, Colorado; and Salt Lake City, Utah.

The remaining two plans chosen for this comparison were the Austin Resource Recovery Master Plan from Austin, Texas and the San Francisco Climate Action Strategy. While these communities and their respective plans are dissimilar to Teton County in their scope as well as the size of the communities they address, they provide context for the nature of zero waste planning throughout the Country and offer a standard of zero waste visioning that is a necessary element to any discussion of zero waste planning.

The following table lists the communities I selected for comparison and features some of the basic characteristics significant to zero waste planning among them.

Community	Population 2010[34]	ZW Plan Approved	Diversion Rate Starting Point	Zero Waste Goal
San Francisco, CA	805,235	2009	50% in 2010	100% diversion by 2020[35]
Austin, TX	790,390	2009	38% in 2010	75% diversion by 2020 95+% diversion by 2040[36]
Salt Lake City, UT	186,440	2013	38% in 2011	Zero waste by 2040[37]
Boulder County, CO	294,567	2010	35% in 2009	Zero waste or damn near by 2025[38]
Fort Collins, CO	143,986	2013	42% in 2012	75% diversion by 2020 90% diversion by 2025[39]
Teton County, WY	22,268	Pending	34% in 2014	60% in 2030

Table 4.1: Characteristics of comparable zero waste planning communities.

34 "United States Census Bureau." State and County QuickFacts. Accessed January 24, 2015. http://quickfacts.census.gov/.

35 San Francisco Environment, "Zero Waste FAQ," accessed October 11, 2014, http://www.sfenvironment.org/zero-waste/overview/zero-waste-faq

36 City of Austin. "Austin Resource Recovery Master Plan, Chapter 3: Zero Waste," http://www.austintexas.gov. December 15, 2011.

37 Salt Lake City. "Sustainable Salt Lake Plan 2015." www.slcgreen.com. 2014.

38 County of Boulder. "Boulder County Zero Waste Action Plan." http://www.bouldercounty.org. December, 2010.

39 City of Fort Collins. "Road to Zero Waste Plan." http://www.fcgov.com. December 2013.

4.1 Methodology for Evaluation of Comparable Zero Waste Plans

Following the identification of comparable plans, I conducted a literature review to determine a method for the evaluation and comparison of these plans from varying jurisdictions. Through this review, I discovered that no such procedure exists. I, therefore, derived the methodology for this evaluation from a compilation of standards found in a number of studies regarding municipal plan evaluations.

Stevens et al. explain the lack of plan evaluation methodology in the following statement, "While some practices are generally repeated across most plan quality studies, there is no standardized set of procedures for evaluating the content and quality of plans."[40] They formed this conclusion based on the identification of more than forty articles published on the subject of municipal plan evaluation since 1994. One general practice outlined in the study, however, was a ranking system to evaluate the degree to which certain plan elements were mentioned. Upon review, the plan elements received the following designations: "0"= no mention of a certain element; "1" = minimal mention of a certain element; "2" = thorough mention of a certain element. I selected this system for the evaluation of zero waste plans for the purposes of this report as well.

A study by Tang et al. conducted an evaluation of municipal climate change plans and reported a similar lack of formulaic analysis.[41] Their findings are described in the following, "little research has quantitatively measured the factors influencing local climate change action plan quality."[42] The Tang et al. study does, however, employ a method of identifying keywords and concepts as representative of required elements. For

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[40] Stevens, Mark, Ward Lyles, and Philip Berke. "Measuring and Reporting Intercoder Reliability in Plan Quality Evaluation Research." *Journal of Planning Education and Research* 34, no. 1 (2014): 77.

[41] Tang, Zhenghong, et al., "Moving from agenda to action: evaluating local climate change action plans." *Journal of Environmental Planning and Management* 53, no. 1 (2010): 41-62.

[42] Tang, et al., "Moving from agenda to action," 45.

example, the mention of concepts accepted as indicators of the climate plan "Awareness" category included: *Concept of climate change or global warming; Concept of Greenhouse gas (CO_2) emission; Effects & impacts of climate change; and Long-term goals and detailed targets for GHG emissions*. I used a similar key phrases and concepts methodology in this zero waste plan discussion as well. In zero waste plan phrasing, for example, I determined keywords such as *Culture; Change; Awareness; Signage; Educate; and Guidelines* to serve as references to the social and behavioral aspects of zero waste planning. The following discussion of research from Zaman and Lehmann provides additional reference to the differing aspects of zero waste planning.

Turning the focus specifically toward zero waste plans, guidelines for analysis are derived from research completed by Zaman and Lehmann.[43] Through their examination of communities planning for zero waste, they identified five aspects of community context that exert influence over zero waste planning. These five categories, or "spheres," are environmental concern, social behavior, politics, economics, and technology. An illustration is provided in Figure 4.1 below.

The environmental sphere is identified as the overarching influence for a city's pursuit of zero waste. Zaman and Lehmann cite environmental considerations such as greenhouse gas emissions, pollution mitigation, and conservation of natural resources as common stimulus for zero waste planning.[44] Ackerman exerts that "environmental values and beliefs play the leading role" in encouraging recycling in communities in developed countries.[45]

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[43] Zaman and Lehmann, "Urban Growth and Waste Management."

[44] Zaman and Lehmann, "Urban Growth and Waste Management," 182.

[45] Ackerman, Frank. "Material Flows for a Sustainable City." *International Review for Environmental Strategies*, 2005, 508.

Zaman and Lehmann explain the next sphere, the social aspect of zero waste planning, as the pattern of behaviors among solid waste participants. Additional research from Ackerman, Bialik, Ferrara and Missios, Granzin and Olsen, Hong and Adams, and Zotos et al. details the measurable manifestations of social behaviors in waste diversion participation and fulfillment. Examples of potential modifications include enhanced awareness of waste avoidance measures, curbside collection service for co-mingled materials, increased composting services, an expansion of commercial recycling and composting, and changes to materials accepted/prohibited for recycling, composting, and landfilling.[46]

The political sphere of involves the state legislation, municipal ordinances, and mandatory diversion practices utilized in zero waste planning. Examples are pay-as-you-throw programs, mandatory recycling, and bans on landfill disposal of certain materials that may be necessary to achieve diversion targets.[47]

Economic considerations, with regard to zero waste planning, have the potential for significant impact. Potential shifts in solid waste financing include decreased landfill tip fees, increased costs of recycling infrastructure and services, and the assessment of fees and incentives associated with waste diversion practice.[48]

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[46] Ackerman, "Material Flows," 508.; Bialik, Carl. "San Francisco Stalls In Its Attempt To Go Trash-Free." FiveThirtyEight. September 4, 2014. Accessed September 26, 2014. http://fivethirtyeight.com/features/san-francisco-stalls-in-its-attempt-to-go-trash-free/.; Ferrara, Ida, and Paul Missios. "Recycling And Waste Diversion Effectiveness: Evidence From Canada." *Environmental & Resource Economics* 30 (2005): 221-38.; Granzin, Kent, and Janeen Olsen. "Characterizing Participants in Activities Protecting the Environment: A Focus on Donating, Recycling, and Conservation Behaviors." *Journal of Public Policy and Marketing* 10, no. 2 (1991): 1-27.; Hong, Seonghoon, and Richard Adams. "Household Responses to Price Incentives for Recycling: Some Further Evidence." *Land Economics* 75, no. 4 (1999): 505-14.; Zotos, et al. "Developing a Holistic Strategy for Integrated Waste Management within Municipal Planning: Challenges, Policies, Solutions and Perspectives for Hellenic Municipalities in the Zero-waste, Low-cost Direction." *Waste Management* 29 (2009): 1686-692.

[47] Zaman and Lehmann, "Urban Growth and Waste Management," 182.

[48] Zaman and Lehmann, "Urban Growth and Waste Management," 182.

Finally, the sphere attributed to technology addresses various solid waste processing technologies. As an example, the majority of plans included in this study reference composting technology.[49]

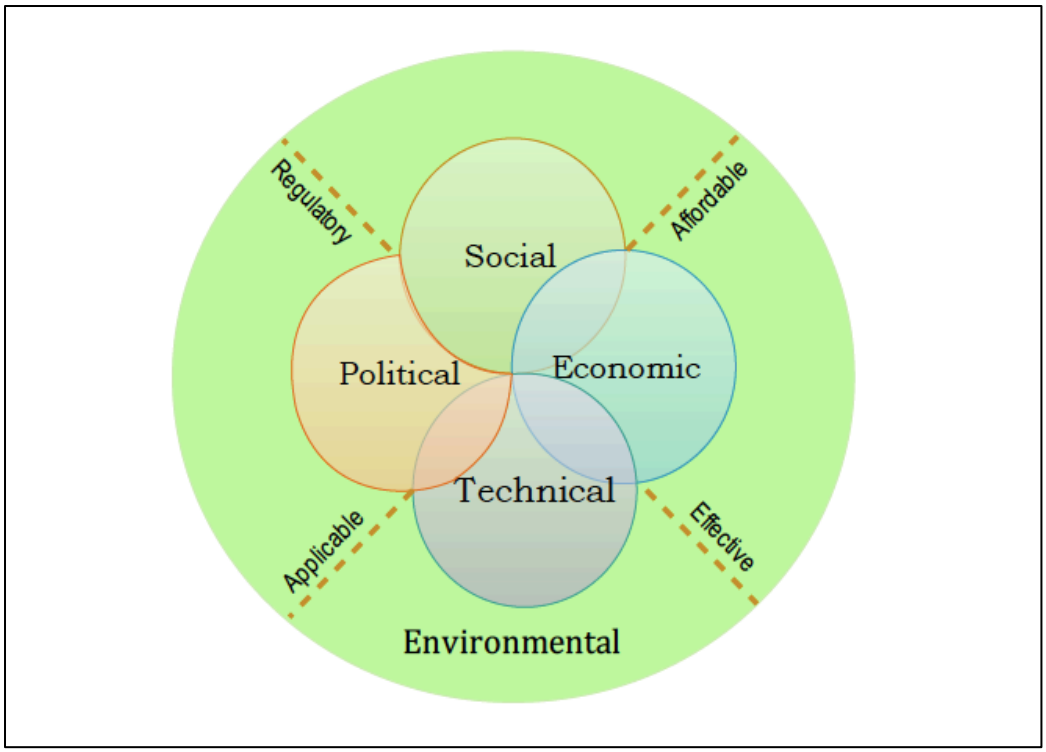

Figure 4.1: Spheres of influence in a zero waste city.[50]

As I will explain in Section 4.2, the recommendations from each municipal plan were examined individually for their emphasis on one of more of these spheres. My hypothesis for this study, referenced in Chapter 1, addressed the degree to which each of these five spheres would be emphasized in the Teton County plan in comparison with areas of emphasis in plans from other communities. My results are presented in Section 4.3.

[49] Zaman and Lehmann, "Urban Growth and Waste Management," 182.
[50] Zaman and Lehmann, "Urban Growth and Waste Management," 182.

Once I derived a method for evaluation from the studies identified above, my next challenge was to navigate the structure of the plans themselves. The lack of consensus for plan evaluation methods is, perhaps, due to the lack of uniform structure utilized in municipal plan format. The zero waste plans from each community varied significantly in their categorization and presentation of information. The plan from Boulder County, for example, is directed solely toward zero waste. San Francisco, however, places zero waste under the umbrella of San Francisco Environment, along with topics ranging from climate change to environmental justice.[51] The City of Austin introduces an interesting perspective on zero waste as a component of a restorative economy.[52]

In order to achieve a streamlined comparison of these plans, I needed to identify a component common to each. I found that, to some extent, each plan contained a core list of what will be referred to in this report as zero waste recommendations. The terminology among plans differed. This core list was referred to as recommendations in a number of plans, as well as strategies, goals, opportunities, and policy options in others. Regardless of the wording, each plan contained some form of itemized zero waste elements to support the overall aim of waste minimization.

To clarify, the use of the term zero waste recommendations refers to the core list of actionable items within a plan. I will use this term throughout the remainder of this report to refer to this category of zero waste plan element. This is the term that has been selected for use in the Teton County zero waste plan as well.

Another consideration in the decision to target the strategic recommendations for plan comparison was that these items appeared to be the most relevant reflection of

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[51] San Francisco Environment, http://www.sfenvironment.org/about

[52] City of Austin. "Austin Resource Recovery Master Plan," 2011, http://www.austintexas.gov.

timely planning initiatives. The structure of all of the plans was such that the recommendations were encased in a framework of general principles and established community vision. As progress is made toward zero waste, it is likely that the framework of these plans will remain. Updates and adjustments, rather, will be made to the specific recommendations. This pattern was verified in plans for communities such as San Francisco and Fort Collins in which zero waste planning has been ongoing for sufficient time to generate multiple versions.[53]

4.2 Evaluation of Emphasis

As I discussed previously, a municipality's effort to shift its solid waste management toward zero waste reflects five aspects of consideration: environmental; social; economic; political; and technological. As such, I evaluated the recommendations from each comparable plan to assess the degree of emphasis on each of these five spheres. I examined keywords and phrasing for reference to particular spheres and designated emphasis based upon the following numerical rankings. Each plan recommendation received at least one ranking of primary emphasis, indicated by a "2." If necessary, when a particular recommendation appeared to place equal primary emphasis on more than one sphere, it received more than one "2." A "1" indicated an identifiable reference to a sphere, but a less than primary emphasis. A "0" reflected no mention.

The following table provides an explanation of the format used for evaluation of zero waste recommendations from each of the comparable communities. Section 4.3 contains a summary table totaling the evaluation of emphasis for each recommendation

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[53] City of San Francisco. Department of the Environment. "San Francisco Climate Action Strategy Update 2013." http://www.sfenvironment.org; City of Fort Collins. "Road to Zero Waste Plan," 2013, http://www.fcgov.com.

from each zero waste plan. The complete phrasing and expanded tables of plan emphasis evaluation can be found in Appendix A: Analysis of Emphasis in Comparable Communities.

Recommendation	Environmental (Env)	Social (Soc)	Political (Pol)	Economic (Econ)	Technological (Tech)
Recommendation as stated in zero waste plan	*0 = no mention*	*1 = minimal emphasis*		*2=primary emphasis*	

Table 4.2: A sample table explaining the ranking of emphasis given to recommendations within each zero waste plan.

4.3 DISCUSSION OF COMPARABLE COMMUNITIES

San Francisco, California

San Francisco is considered a national leader in zero waste initiatives. Legislation passed in 1989 required 50% diversion from landfill by 2000.[54] It was the first U.S. city to implement three-stream sorting for compostables, recyclables, and trash.[55] Its incentivized and mandated diversion policies have been in existence for decades. Pilot programs for pay-as-you-throw initiatives and commercial food waste collection were instituted in the 1990's and have since continued to expand.[56] A more recent ordinance requiring mandatory recycling and composting was issued in 2009.[57] The City reports achievement of 80% landfill diversion as of 2010.

Zero waste policy in San Francisco exists as a component of the larger Climate Action Strategy of the Department of the Environment. Specific zero waste plan

[54] Sullivan, Dan, "Zero Waste on San Francisco's Horizon," *BioCycle*, July 2011, 28, http://www.biocycle.net/2011/07/18/zero-waste-on-san-franciscos-horizon/
[55] Sullivan, "Zero Waste on San Francisco's Horizon," 28.
[56] Sullivan, "Zero Waste on San Francisco's Horizon," 28.
[57] Sullivan, "Zero Waste on San Francisco's Horizon," 28.

recommendations are listed as "Strategies" and "Opportunities."[58] Examples of plan elements include initiatives to ban the use of non-recyclable and non-compostable materials, support the expansion of producer responsibility laws, and continue outreach and assistance to residents and businesses in zero waste practices.

Despite its achievement of advanced levels of waste diversion and the extensive presence of technology and infrastructure, zero waste planning in San Francisco maintains a focus on community participation and the information and incentives to garner it. News of a stall in the City's landfill disposal between 2012 and 2013 was featured in a recent article by Bialik. The article reported that a major challenge in progressing toward zero waste is the participation of residents in landfill diversion practices. Examples of participation challenges were noted as failure to sort recyclables correctly, unwillingness to complete proper disposal, failure to capture a majority of compostable material, and contamination of compost by plastic bags. "San Francisco's stall shows that a city's biggest obstacle to achieving big goals [in zero waste] may be the people it serves."[59]

The following analysis reflects an emphasis on the social and political aspects of zero waste practices.

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[58] City of San Francisco, "San Francisco Climate Action Strategy Update 2013."
[59] Bialik, Carl. "San Francisco Stalls In Its Attempt To Go Trash-Free." FiveThirtyEight. September 4, 2014, http://fivethirtyeight.com/features/san-francisco-stalls-in-its-attempt-to-go-trash-free/.

Recommendation	Env	Soc	Pol	Econ	Tech
Banning the use of Styrofoam and other brands of polystyrene foam in City departments and by food service operators	0	0	2	0	0
Banning the use of non-compostable plastic bags	0	1	2	0	0
Requiring every event held in San Francisco to offer recycling and composting	0	2	2	0	0
Reducing packaging	0	2	1	0	0
Reducing GHG emissions from food	1	2	1	0	0
Reducing consumption	1	2	1	0	0
Increasing diversion of construction and demolition material	0	0	2	0	0
Supporting the expansion of producer responsibility laws	0	0	2	0	0
Strengthen compliance with mandatory source separation of recyclable and compostable materials	0	2	2	0	0
Developing a zero waste facility	0	0	0	1	2
Utilizing anaerobic digestion	0	0	0	0	2
Working to develop the secondary materials market for recyclables, compostables, and their post processed derivatives	0	1	0	2	0
Decreasing use of disposable products	0	2	2	0	0
Increasing reuse, recycling, composting, and recycled content of products through producer responsibility initiatives	0	2	0	0	0
Total	**2**	**16**	**17**	**3**	**4**
Instances of Primary Emphasis	**0**	**7**	**7**	**1**	**2**

Table 4.3: Analysis of Emphasis by Recommendation for San Francisco zero waste plan.

Austin, Texas

Zero waste planning in Austin, Texas is also part of a larger initiative. Austin considers zero waste to be a component of its Resource Recovery Plan and its ultimate goal to establish a "restorative economy" by 2050. A restorative economy is defined as a, "move beyond Zero Waste systems to an economy based on maximizing the value of goods and services while reducing the impact of our ecological footprint on the environment."[60] The zero waste plan for the City of Austin displays its emphasis clearly with the use of the following recommendation headings: Voluntary, Education, and Incentives; New Rules and Advocacy; and New City Programs. These concepts provide direct reference to the social and political spheres of zero waste planning. Individual recommendations are listed under these headings. They address concepts such as a focus on infrastructure, job creation, and waste reduction.

As in the analysis for San Francisco, the plan recommendations for Austin emphasize, above all, the social and political aspects of zero waste programming. This is another example, for consideration by Teton County, in which a municipality with advanced vision for zero waste maintains a core emphasis on basic social and regulatory efforts in its plan communication.

[60] City of Austin. "Austin Resource Recovery Master Plan," 2011, 39.

Recommendation	Env	S/B	Pol/Reg	Econ	Tech
Require Producers to Take Responsibility for Products	1	2	2	0	0
Lead by example. Reduce/recycle City of Austin agency waste.	0	2	2	1	0
Reduce waste from single family homes	0	2	1	1	0
Reduce waste from commercial, multi-family, and institutional entities	0	2	1	1	0
Reduce waste from development projects	0	2	2	1	0
Develop and invest in Zero Waste infrastructure	0	2	1	1	0
Enlist region to support Austin Zero Waste efforts	0	1	2	1	0
Retain and Expand Green Businesses and Green Collar Jobs	1	2	1	1	1
Encourage Green Building Construction Standards	1	2	2	1	1
Total	**3**	**17**	**14**	**8**	**2**
Instances of Primary Emphasis	**0**	**8**	**5**	**0**	**0**

Table 4.4: Analysis of Emphasis by Recommendation for zero waste plan Austin, TX

Salt Lake City, Utah

Zero waste in Salt Lake City is incorporated into the Sustainable Salt Lake Plan 2015. This plan identifies three main goals for recycling and materials management: to reduce waste; to increase recycling and eliminate waste by 2040; and to foster the highest and best use of materials.[61] Recommendations are listed as Strategies and Targets.

[61] Salt Lake City. "Sustainable Salt Lake Plan 2015," 2014.

Examples of plan recommendations include engaging residents in waste reduction, exploring and improving incentive options, and evaluation of collection services.

This plan exhibits a majority of emphasis on the social components of zero waste planning with a focus on behavioral measures that can be supported by municipal programs. It provides a worthy example for Teton County of a design based upon fundamental zero waste participation and the advocacy by local government in support of the proposed efforts.

Recommendation	Env	S/B	Pol/Reg	Econ	Tech
Improve price incentives to reduce waste and increase recycling	0	0	0	2	0
Engage residents and businesses in waste reduction and recycling	0	2	0	0	0
Reduce contamination of recyclables and compost by actively enforcing refuse code	0	0	2	0	0
Increase glass recycling through drop-off and curbside collection	0	2	0	0	0
Develop capacity for composting or recovering energy from food scraps and other compostables	0	2	0	0	2
Evaluate every-other-week garbage collection	0	2	0	0	0
Explore incentives and requirements to increase commercial recycling	0	2	1	0	0
Increase recycling of construction and demolition materials	0	0	2	0	0
Total	**0**	**10**	**5**	**2**	**2**
Total Instances of Primary Emphasis	**0**	**5**	**2**	**1**	**1**

Table 4.5: Analysis of Emphasis by Recommendation for zero waste plan Salt Lake City, Utah

Boulder County, Colorado

Boulder County is a regional as well as national leader in zero waste planning. They have a goal of 50% diversion by 2015 and zero waste by 2025.[62] Through outreach and education that extends far beyond their own community, they are strengthening efforts in collection of recyclables and compostables, options for hard to recycle materials, and community-wide waste reduction targeting residential/commercial/municipal events and practices.[63]

The Zero Waste Action Plan for Boulder County includes an extensive amount of detail for each recommendation. This plan has been utilized extensively by the Teton County zero waste committee as a guide for plan format and scope of recommendations. The emphasis, again, is placed primarily on the social and political spheres, with a notable acknowledgement of economic considerations.

[62] County of Boulder, "Boulder County Zero Waste Action Plan," 2010.
[63] EcoCycle, http://www.ecocycle.org. Accessed June 6, 2014.

Recommendation	Env	S/B	Pol/Reg	Econ	Tech
Support capacity for construction and demolition transfer, sorting and possible processing	1	2	1	2	0
Require construction and demolition project recycling and reuse	1	1	2	1	0
Clean damaged dimensional lumber should be included in slash management programs	1	2	2	1	0
Support capacity for additional composting	2	2	1	1	1
Provide curbside collection of compostable materials	1	2	2	1	1
Total at-home composting program	1	2	1	1	0
Support opportunities for tree limb management	1	2	1	1	0
Volume-Based residential collection and embedded recycling (Pay As You Throw)	1	2	2	1	0
Increase Electronics Collection	1	2	2	1	0
Offer metal recycling at additional locations	1	2	1	1	0
Support commercial food composting	1	2	1	2	0
Commercial Volume-Based Collection with Enhanced Recycling Programs	1	2	2	2	0
Provide free waste audits for businesses	1	2	1	1	0
Land-Use Code Updates – improve commercial and multifamily recycling requirements	1	1	2	1	0
Municipal contact and advocate	1	2	2	1	0
Develop “Zero Waste” branding and initiate comprehensive education program	1	2	1	0	0
Determine Zero Waste funding mechanism	0	1	1	2	0
Require trees and slash from grubbing and landscaping to be diverted from landfill	1	2	2	1	0

Table 4.6 Continued

Support ban on yard materials going to landfill	1	1	2	1	0
Support ban on food scraps going to landfill	1	1	2	1	0
Support ban on recyclables going to landfill	1	1	2	1	0
Support multifamily compost collection system	1	2	1	1	0
Single-stream multifamily recycling collection countywide	1	2	1	1	0
Secure Advanced Disposal Fees on priority items	1	2	2	2	0
Provide zero waste building planning assistance	1	2	0	1	0
Require Zero Waste planning for large events on public property	1	2	2	1	0
Promote markets for county-generated recyclables and compost	0	2	1	1	0
Support Product Stewardship initiatives, including Extended Producer Responsibility at the state and local level	0	1	2	0	0
Total	**26**	**49**	**42**	**31**	**2**
Total Instances of Primary Emphasis	**1**	**21**	**14**	**5**	**0**

Table 4.6: Analysis of Emphasis by Recommendation for zero waste plan Boulder County, Colorado

Fort Collins, Colorado

Fort Collins is a slightly smaller community located approximately 50 miles from Boulder and a zero waste success story in its own right. In many ways, Fort Collins is a more appropriate model for Teton County because it exemplifies more of a stepping-stone between the initial stages of planning in Teton County and the absolute declaration

of 100% diversion made by Boulder County. The emphasis and strategies exhibited in this plan are closer to the aims that Teton County may wish to focus on as it begins its approach.

The Fort Collins plan uses the term recommendations for its core strategies. They are provided in the broad categories listed in Table 4.7 below. One unique aspect of the Fort Collins plan is the close alignment it maintains between the zero waste recommendations and the City's comprehensive plan codes. This is reflected in the emphasis recorded on the political sphere. Additional emphasis is, as expected, found to be on the social sphere.

Recommendation	Env	S/B	Pol/Reg	Econ	Tech
Culture Change	1	2	1	0	0
Reinvest Resources in Local Economy	1	1	2	2	1
Universal Recycling	0	2	1	1	0
Prohibited Materials	0	1	2	0	0
Construction, Deconstruction and Demolition	0	2	2	1	0
Composting Organic Materials	0	2	1	1	2
Reduce & Reuse	0	2	2	1	0
Product Stewardship	0	2	1	1	0
Waste-to-Clean Energy	0	0	1	0	2
Funding	0	1	1	2	0
Regional Cooperation	0	2	2	1	0
Total	**2**	**17**	**16**	**10**	**5**
Total Instance of Primary Emphasis	**0**	**7**	**5**	**2**	**2**

Table 4.7: Analysis of Emphasis by Recommendation for zero waste plan Fort Collins, Colorado

4.4. SUMMARY OF EMPHASIS

The following tables (4.8 and 4.9) provide a summary of the totals for areas of emphasis from each of the plans evaluated. As I discussed previously, a direct quantitative analysis of plan emphasis is not feasible given the variability among zero waste plan design. The information that can be determined from this qualitative review, however, is that reference to the social aspects of zero waste strategies is heavily emphasized in all plans for all stages of zero waste planning examined here. The categories next heavily emphasized include the political and economic spheres. These categories involve the implementation, regulation, and financial framework necessary for the incorporation of shifting social attitudes and behavior associated with an approach toward zero waste.

The environmental sphere is, perhaps, misrepresented in this form of analysis. As explained by Zaman and Lehmann, the environmental sphere functions as an overarching sphere of zero waste planning.[64] Its presence is fundamentally implied rather than reiterated in an itemized fashion. As such, this type of line item tally is likely incompatible with an analysis of the environmental sphere.

Finally, technology is reflected as secondary in emphasis to social, political, and economic operations. This designation presents a rather interesting consideration with respect to zero waste planning for these communities. If there were, for instance, a single technology, or number of technologies, that would ensure the achievement of zero waste, it would be expected that communities with adequate resources would simply employ this technology. One such technology, incineration, is used in a number of regions around the world. The fundamental tenets of zero waste, however, do not consider this to be an acceptable practice. As stated by Zaman and Lehmann, "the process of incineration

[64] Zaman and Lehmann, "Urban Growth and Waste Management," 2011, 182.

terminates resources for a single output of energy gain without seeking any alternative reuse or resource recovery options."[65]

The value of this analysis, for Teton County, lies in the reassurance that no standard plan format exists and the understanding that all stages of zero waste planning emphasize social practices as well as political reinforcement. In the following chapter, I will illustrate the extent to which these plans influenced preliminary drafts of the Teton County zero waste plan.

City	Environmental	Social	Political	Economic	Technological
San Francisco, CA	2	15	16	3	4
Austin, TX	3	17	14	8	2
Salt Lake City, UT	0	10	5	2	2
Boulder County, CO	26	49	42	31	2
Fort Collins, CO	2	17	16	10	5
Total	**33**	**108**	**93**	**54**	**15**

Table 4.8 Sum of total emphasis on spheres of zero waste planning.

[65] Zaman and Lehmann, "Urban Growth and Waste Management," 2011, 185.

City	Environmental	Social	Political	Economic	Technological
San Francisco, CA	0	7	7	1	2
Austin, TX	0	8	5	0	0
Salt Lake City, UT	0	5	2	1	1
Boulder County, CO	1	21	14	5	0
Fort Collins, CO	0	7	5	2	2
Total Instances of Primary Emphasis	**1**	**48**	**33**	**9**	**5**

Table 4.9 Sum of total instances of primary emphasis on spheres of zero waste planning.

Chapter 5: Teton County Zero Waste Plan Draft

As I outlined in previous chapters, the sources and analysis that informed the initial steps toward zero waste planning in Teton County were numerous. Equipped with this information, ISWR staff, Advisory Board members, and volunteers (myself included) began drafting strategic recommendations for inclusion in the zero waste plan in the fall-winter of 2014.

5.1 Early Plan Organization

We based early drafts of strategies for the Teton County zero waste plan upon the information described thus far – historical data, existing conditions and operations, consultant reports, comparable communities, and input from other zero waste planning organizations, as well as internal staff and advisory board members. While the major pillars of zero waste were consistent across all of the above references, the format for ways in which strategies could be organized into a plan of action was rather varied. The strategies in Teton County began as lists. These initial lists were nothing more than broad categories into which strategies could be organized. The categories included concepts such as material streams, timelines, diversion percentages, guiding principles, sectors of responsibility, and actions.[66] An example of an early list is included in Appendix B. Initial List of Zero Waste Categories.

Next, with the SERA report as a starting point, we compiled a list of possible zero waste recommendations. In addition to the SERA recommendations, we derived potential recommendations from internally identified needs and operations as well as applicable elements from the plans evaluated from other cities. The first complete listing

[66] Teton County Zero Waste Committee meeting notes, September 26, 2014.

included sixty possible recommendations. This draft, from October 2014, is included in Appendix C. Initial List of Zero Waste Recommendations.

Eventually, we reduced the sixty recommendations to just under forty and made adjustments to the method in which they were sorted. Primary arrangement was ultimately based on timeline. It became clear that placing each recommendation into a short, mid, or long-term prioritization added significant clarity and function to the list.[67] Subsequent to timeline, the recommendations were sorted into action categories. The following five primary actions took shape as effective divisions of zero waste activity within the plan: Administrative; Pay As You Throw (PAYT); Recycling; Composting; and Construction and Demolition (C&D). A color scheme was assigned to each category to be consistent with previous color-coding in solid waste operations:

Administrative = Tan

Pay As You Throw = Purple

Recycling = Blue

Composting = Green

C&D = Orange

A sample of this plan arrangement is included in Appendix D. Zero Waste Recommendations Sorted and Coded. It is from this iteration that the current version of the recommendations draft was derived. Advancements between the draft in Appendix D and the current version are explained in section 5.2.

5.2 CURRENT VERSION OF ZERO WASTE RECOMMENDATIONS

At the time I proposed this report, a final draft of zero waste recommendations was scheduled for presentation to the Board of County Commissioners during the spring

[67] Teton County Zero Waste committee meeting, October 17, 2014.

of 2015. That presentation has been delayed until July 2015. As such, the most recent version of recommendations is available in Appendix E. Current Version of Zero Waste Recommendations. In the following discussion, I summarize the main elements of each of the five categories of action. In Chapter 6, I list the recommendations in their entirety and provide an analysis of the areas of emphasis with respect to plans from other communities.

Administrative Recommendations

The administrative recommendations included in the current draft of the Teton County zero waste plan address the organizational, informational, and logistical aspects of zero waste objectives. This category serves to generate awareness and information to ensure communication of and participation in zero waste practice. Examples from this category of recommendation include, developing a zero waste brand for Teton County, providing zero waste event toolkits for community events, and establishing a recognition program for businesses demonstrating zero waste practices. These types of administrative measures exist in plans from comparable communities as well, and, as illustrated in the case of San Francisco, even with the achievement of diversion beyond 80%, there is still a need for emphasis on public participation and awareness of zero waste procedures.[68]

Pay As You Throw Recommendations

Pay As You Throw (PAYT) functions as a linch pin in zero waste planning. It seems to be the element around which other strategies and programs fall into place.[69]

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[68] Bialik, Carl. "San Francisco Stalls In Its Attempt To Go Trash-Free." FiveThirtyEight. September 4, 2014.

[69] Maryland Recycling Network, "Pay As You Throw: Endless Option and Opportunities," Webinar presentation, February 26, 2015.

PAYT establishes a waste collection program in which customers are charged based on the volume of waste they discard. It exists in several forms but generally involves either designated garbage cart sizes for which customers pay more for larger containers or, in some cases, customers pay per bag of garbage they throw away. By limiting the amount of material a customer can discard as trash, emphasis is placed on items that can be recycled, reused, or composted. The success of PAYT in increasing the volume of recycling is proven. Sources attribute up to 50% increased recycling with PAYT and 17% decreased waste disposal.[70]

A byproduct of the approach toward zero waste has exposed an element of PAYT previously unexplored. On the surface, with PAYT programming, it is often explained that customers pay for garbage, and then recycling and composting are embedded services. As a customer works to diligently recycle, compost, and reuse materials in an effort to eliminate their need for a garbage can, their reward, in turn, is not a zeroing of their solid waste utility fees. Recycling and composting operations do have an associated cost. PAYT systems must be designed so that they are less than the cost of garbage disposal, but not, in fact, free of charge.[71] As such, experts recommend a hybrid PAYT system in which a portion of the collection fee varies by volume but a certain portion of fees are fixed.

Other important points to note concerning PAYT are that, with limits placed on waste disposal, customers must be given adequate options for alternative waste disposal. The more options for recycling and composting, the more customers are able to take

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[70] Skumatz, Lisa and Juri Freeman. *Increasing Recycling Now! Guidebook for Community Adoption of Recycling and Pay As You Throw Ordinance*. Superior, CO: Skumatz Economic Research Associates, Inc., 2008.

[71] Maryland Recycling Network, "Pay As You Throw: Endless Option and Opportunities," Webinar presentation, February 26, 2015.

advantage of PAYT and pay less for reduced volumes. Aspects of recycling identified as especially influential include, choice in container size; curbside collection of recyclables; and range and co-mingling of recyclable materials collected.[72] Concerns over illegal dumping and disposal are diminished as well when adequate alternatives for waste disposal are provided. For this reason, it is suggested that PAYT is coupled with curbside collection of recyclables, acceptance of a co-mingled recycling stream, and residential yard waste collection options in the Teton County plan.

Teton County PAYT program recommendations are separated into an exploration phase in the short-term and implementation phase in the mid-term. Division is also made between single-family and multi-family ordinances.

Recycling Recommendations

As discussed in Chapter 2, recycling in Teton County at the present time is voluntary, source separated, and drop-off only. Curbside collection is offered through a private company, but is not widespread throughout the community. Ninety-five percent of the curbside collection service is made up of commercial customers.[73] The majority of residential customers perform voluntary, source separated, drop-off of their recyclables. There are seven community drop-off centers similar to the one depicted below in Figure 5.1.

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72 Hong and Adams, "Household Responses to Price Incentives for Recycling: Some Further Evidence," 1999.

73 Dorsey, Jennifer, "Curbside Recycling Celebrates 20th," *Jackson Hole News and Guide*, September 3, 2014, http://www.jhnewsandguide.com/news/business/biz_quiz/curbside-recycling-celebrates-th/article_e87ec00e-a06b-5377-83f7-c350bb1744a6.html

Figure 5.1 Community bin for source separated, drop-off of recyclables.

Due to the relatively limited extent of services existing in Teton County, the zero waste recommendations pertaining to recycling address fundamental steps in the establishment of facilities and services. Examples include the acceptance of a co-mingled stream, the expansion of curbside collection services, and the mandated recycling of commercial cardboard as well as beverage containers from businesses in possession of permits to serve alcohol, an ABC Ordinance.

It is expected that the integration of these operations into the already enthusiastic recycling realm of Teton County will contribute a significant increase in recycling volume and diversion of recyclable materials from the landfill.[74]

Composting Recommendations

Commercial yard waste composting operates through a private contractor, Terra Firma Organics. The zero waste plan calls for increases in composting programs

[74] Adams, Laurie. *Conceptual MRF Sizing & Cost Analysis*. Denver, CO: LBA Associates, Inc., 2014; Skumatz Economic Research Associates, Inc., "Jackson Community Recycling Long Range Plan," January 2010.

including the completion of new facilities for the acceptance and processing of organic food waste, the collection of commercial food waste, and advances in residential yard waste collection or bin deposit technology.

According to the U.S. Environmental Protection Agency, compostable organics including yard waste, food waste, and compostable paper make up nearly 50% of municipal solid waste tonnage.[75] The capacity to recover this material through composting will contribute a significant amount of diversion potential in Teton County.

Construction and Demolition Recommendations

As in other communities, construction and demolition materials contribute to the volume of solid waste in Teton County. The recommendations included in the Teton County zero waste plan to address this material stream include recognition opportunities for zero waste construction and model building sites, as well as deposit incentives and, eventually, required diversion of C&D Materials from landfill disposal.

These recommendations are adapted from recommendations by SERA, as well as examples provided by zero waste plans from Boulder and Fort Collins, Colorado.[76]

5.3 Zero Waste Recommendation Templates

In preparation for the arrangement of recommendations into a plan format, committees were formed for each action category. ISWR staff, Advisory Board members, and volunteers were assigned to each of the five action category committees: Administration, Pay As You Throw, Recycling, Composting, and Construction and Demolition. Committee members were given templates to fill out for each recommendation.

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[75] EPA Facts and Figures, 2011

[76] County of Boulder, "Boulder County Zero Waste Action Plan," 2010; City of Fort Collins, "Road to Zero Waste Plan," 2013.

The information requested for each recommendation was modeled after the Boulder County Zero Waste Action Plan 2010. This plan dedicates an entire page to each recommendation and provides extensive detail. The reasoning behind each recommendation is explained, along with current conditions, goals, metrics of success, financial parameters, environmental impact, and educational and community engagement aspects and intentions. Appendix F. Zero Waste Recommendation Template includes a sample of the templates utilized by the Teton County zero waste committees.

Feedback thus far from committee work on the templates is that they are labor intensive but worthwhile.[77] The information is intended to provide the language that will eventually be used in the final version of the zero waste plan. In developing that language, however, the committees are providing a thorough examination of each proposed recommendation and giving careful consideration to the applicability, affordability, and effectiveness of each item. As I will discuss in Chapter 6, these aspects of zero waste planning are the qualifiers by which zero waste strategies are assessed and valued.

[77] Teton County Zero Waste committee meeting, March 24, 2015.

Chapter 6. Analysis of Teton County Zero Waste Plan Draft

6.1 Summary of Emphasis for Teton County Plan Draft

With respect to my hypothesis for this report - that the initial strategic recommendations for an approach to zero waste in Teton County would exhibit emphasis on the environmental, social, economic, and technological aspects of zero waste planning, with minimal mention of political and regulatory considerations – the following table provides a tally. As expected, the social and behavioral elements of zero waste planning received primary emphasis in the current zero waste plan draft. Contrary to anticipated results, however, the initial plan for Teton County exhibits a notable emphasis on the political aspects of zero waste planning. The plan, in fact, includes numerous recommendations that call for municipal ordinances and mandates on compliance with waste diversion practices. The majority of these mandatory recommendations target commercial, large scale operations. Examples include required composting of commercial yard waste, required commercial corrugated cardboard recycling, required diversion of construction and demolition materials, and mandatory commercial recycling of alcoholic beverage containers.

As discussed previously, this tally of emphasis is not an exact measure of plan elements. It is, rather, a general survey of the language present in the communication of zero waste recommendations. It should be noted, for the Teton County plan, especially, that a significant amount of economic and technological influence will be required to establish the infrastructure and operations necessary to eventually enforce a mandate on waste diversion practices. Even so, the inclusion of a number of regulatory measures in the initial zero waste plan communicates strong intent for the future of zero waste planning. Approval of these recommendations by the Board of County Commissioners

will convey a powerful message to Teton County businesses and residents about the commitment to zero waste in this community.

Recommendation	Env	S/B	Pol/Reg	Econ	Tech
Community Recycling Survey	0	2	0	0	0
Track Residential vs. Commercial Waste at Trash Transfer Station	0	2	0	0	0
Tiered Tip Fees	0	1	0	2	0
Develop Zero Waste Branding for Teton County	0	2	0	0	0
Provide Initial Guidance and Resources for Zero Waste Planning by Commercial Businesses	0	2	0	0	0
Provide ZW Event Toolkits and Instruction	0	2	1	0	0
Establish Town/County Purchasing Policies to Encourage Waste Reduction through Waste Avoidance, Reuse, and Recycling	0	2	1	0	0
Online Directory of Reuse/Repair Resources	0	2	0	0	0
Support the Town of Jackson in Establishing a Fee on the Use of Plastic Bags by Retail and Food Service Businesses	0	2	1	2	0
Recognition Program for Zero Waste Plans by Commercial Businesses	0	2	0	0	0
Building Code Requirements for Equal Recycling Space	0	1	2	0	0
Require ZW Planning for Events Requiring Town/County Permits	0	1	2	0	0
Explore Residential Single-Family PAYT Ordinance	0	2	2	0	0
Explore Residential Multi-Family PAYT Ordinance	0	2	2	0	0
Implement Residential Single-Family PAYT Ordinance	0	1	2	0	0
Implement Residential Multi-Family PAYT Ordinance	0	1	2	0	0

Table 6.1 Continued

Education and Awareness to Increase Recovery of Materials Currently Accepted for Recycling	0	2	0	1	0
Expand Materials Accepted for Recycling	0	2	0	0	0
Municipal Bins for Recycling of Commercial Corrugated Cardboard	0	2	0	1	0
Accept Co-mingled Recycling Stream (Single of Dual)	0	2	0	0	0
Curbside Collection of Co-mingled Recyclables from Residential, Multi-family, and Commercial Customers	0	2	2	1	0
Mandatory Recycling of Residential Cardboard	0	1	2	0	0
ABC Ordinance	0	0	2	0	0
Continue and Expand Seasonal And Special Event Composting Programs	0	2	0	0	0
Establish Master Composter Certification Program	0	2	0	0	0
Require Commercial Landscapers to Compost Yard Waste Materials	0	1	2	0	0
Consider Card Swipe Technology for Residential Yard Waste Bins	0	1	0	1	2
Complete Survey of Commercial Food Waste Recovery Program	0	2	0	0	0
Construction and Operation of Expanded Composting Facility	0	2	0	0	1
Ensure Opportunity for Collection of Commercial Food Waste	0	2	0	0	0
Ban Disposal of Yard Waste in Landfill	0	0	2	0	0
Recognition Opportunity for Zero Waste Construction	0	2	0	0	0
Model Building Site	0	2	0	0	0
C&D Deposit Incentive	0	1	2	1	0
Required Diversion of C&D Materials	0	0	2	0	0
Total	**0**	**55**	**29**	**9**	**3**
Total Instances of Primary Emphasis	**0**	**23**	**13**	**2**	**1**

Table 6.1 Summary of emphasis reflected in Teton County zero waste recommendations.

6.2 COMPARISON OF PLAN EMPHASIS BETWEEN TETON COUNTY AND COMPARABLE COMMUNITIES

In a continuation of the discussion from Chapter 4, the data from the analysis of the Teton County zero waste draft plan has been added to the summary tables below. This compilation provides a comparison of emphasis for all of the communities analyzed. As I have explained, an analysis of general emphasis, as well as primary emphasis, in the wording of zero waste recommendations reveals an overwhelming focus on the social and political aspects of zero waste planning. From the totals listed here, it can be stated that the draft zero waste plan for Teton County reveals emphasis on the spheres of zero waste planning in a similar pattern to that conveyed by the communities included in the comparison.

City	Environmental	Social	Political	Economic	Technological
San Francisco, CA	2	15	16	3	4
Austin, TX	3	17	14	8	2
Salt Lake City, UT	0	10	5	2	2
Boulder County, CO	26	49	42	31	2
Fort Collins, CO	2	17	16	10	5
Teton County, WY	0	55	29	9	3
Total Emphasis	**33**	**163**	**122**	**63**	**18**

Table 6.2 Sum of total emphasis on spheres of zero waste planning.

City	Environmental	Social	Political	Economic	Technological
San Francisco, CA	0	7	7	1	2
Austin, TX	0	8	5	0	0
Salt Lake City, UT	0	5	2	1	1
Boulder County, CO	1	21	14	5	0
Fort Collins, CO	0	7	5	2	2
Teton County, WY	0	23	13	2	1
Total Instances of Primary Emphasis	**1**	**71**	**46**	**11**	**6**

Table 6.3 Sum of total instances of primary emphasis on spheres of zero waste planning.

6.3 APPLICABLE, AFFORDABLE, EFFECTIVE, AND ALIGNED

Beyond the spheres of influence, Zaman and Lehmann assert that zero waste considerations be evaluated based on their local applicability, affordability, effectiveness, and alignment with the prevailing regulatory environment.[78] In the following discussion, I assess the proposed zero waste recommendations for Teton County against these parameters.

For the purposes of this evaluation, I consider recommendations to be applicable if they are primarily focused on municipal solid waste, and if they pertain to the environmental, social, political, economic, and technological considerations listed previously. As I have shown, the focus of the recommendations for Teton County does

[78] Zaman and Lehmann, "Urban Growth and Waste Management," 2011, 182.

indeed apply to municipal solid waste and addresses the five spheres of zero waste consideration. Evidence of the degree of emphasis on these spheres is provided in Tables 6.1-6.3 above.

Further, the recommendations for zero waste are in keeping with additional local efforts in environmental sustainability. Some of the more notable projects currently underway within the County include a Town of Jackson 40x20 Initiative that addresses aspects of energy efficiency, water conservation, and reduction of the solid waste stream.[79] Another ongoing endeavor involves the community's participation in the Sustainable Destinations Program. Teton County is one of only six participants in the Early Adopters category of this program sponsored by the Global Sustainable Tourism Council.[80] The council recognizes efforts in aspects of sustainability, including waste minimization. Finally, an upcoming collaboration between a corporate enterprise and nearby Grand Teton National Park is scheduled to target zero waste. The details are confidential, awaiting official release, but preliminary discussions indicate that future progress toward zero waste within the national park system may originate in Teton County. These projects provide evidence to show that the County's zero waste effort is not operating in isolation. It is woven into a larger sustainability initiative that will provide context, applicability, and support.

Affordability is a principal consideration for Teton County zero waste efforts given the upfront need for capital expansion of facilities and operations. I expect recommendations to be evaluated based on the amount of potential diversion per cost of implementation. I anticipate that the construction and facilities upgrades discussed

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[79] Town of Jackson 40x20 Initiative: Action Plan, 2013, http://townofjackson.com/files/3714/0906/9690/40x20_staff_report_FINAL_021614.pdf

[80] Jackson Hole and Yellowstone Sustainable Destination Program, http://sustainabledestination.org, accessed January 19, 2015.

previously will be prioritized because they will need to be operational in order to achieve intended diversion targets. Research provided by Judge and Becker as well as consultant reports from SERA and LBA Associates offer additional information concerning the costs and revenue potential associated with individual waste diversion measures.[81]

A second priority under the umbrella of affordability will be consideration of costs at the household level. Changes in the cost of garbage disposal fees through Pay As You Throw as well as the potential for new or increased fees associated with recycling and composting are possible with the implementation of zero waste programs. Studies by Ackerman indicate a willingness of U.S. households to pay for municipal recycling programs.[82] Given this information, as well as demonstrated voluntary recycling participation by Teton County residents, I expect that strategic recommendations which result in a potential increase in household costs will be put forward in the initial zero waste recommendations.

Recommendations will be prioritized for effectiveness based on their potential to increase the percent diversion of waste from landfill. Determination of the diversion potential of the proposed recommendations is currently in process. The zero waste committee is utilizing research from SERA, as well as the EPA municipal solid waste facts and figures.[83] It is expected that programs that have achieved successful diversion

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[81] Judge, Rebecca, and Anthony Becker. "Motivating Recycling: A Marginal Cost Analysis." *Contemporary Economic Policy* XI (1993): 58-68; Adams, Laurie. *Conceptual MRF Sizing & Cost Analysis*. Denver, CO: LBA Associates, Inc., 2014; Skumatz Economic Research Associates, Inc., "Jackson Community Recycling Long Range Plan," January 2010.

[82] Ackerman, "Material Flows for a Sustainable City," 2005.

[83] Skumatz, Lisa. *Quantitative Effects of Program Choices on Recycling and Green Waste Diversion: Beyond Case Studies*. Seattle, WA: Skumatz Economic Research Associates, Inc., 1996; Skumatz and Freeman. *Increasing Recycling Now!* 2008; Skumatz and Freeman. *Jackson Community Recycling Long Range Plan*, 2010; "Municipal Solid Waste Generation, Recycling, and Disposal," U.S. Environmental Protection Agency, 2011.

in other communities will prove similarly effective in Teton County. Characteristics unique to Teton County that may influence the effectiveness of zero waste efforts include a small population, geographic isolation, and seasonal population swells. These characteristics will be factored into the comparison with other communities in determining the effectiveness of strategic recommendations.

Finally, as discussed previously, the regulatory environment in Teton County, while receptive to zero waste ideology, may be less prepared to mandate diversion practices without further exploration of voluntary practices and expansion of solid waste facilities and operations. I predict, therefore, that zero waste strategies involving a regulatory component will be scheduled for delayed, long-term implementation in the timeline of the zero waste plan.

Chapter 7: Discussion and Conclusions

Zero waste planning in Teton County, Wyoming is significant for two reasons. The first, as I discussed previously, is its groundbreaking venture as one of the few small, rural communities to embrace such a large goal. The second is the measured approach with which it is doing so.

A common response to a declaration of zero waste is the question of whether or not zero is a meaningful term. Can zero actually be reached? The answer varies widely among communities and organizations and is often vague. In Teton County, however, the response it that, for now, zero means 60% landfill diversion over the next 15 years. While much can be learned from communities, like the ones included in this report, that are well on their way to over 70 and 80% diversion, there is value in the study of communities in the early phases of zero waste planning as well.

In this study, I detail the evolution of zero waste in the Teton County community from its earliest scribbled lists of ideas to the narrowing of these lists into precise recommendations that are applicable, affordable, effective, and aligned with local regulatory vision. As I explained, this is not a direct path. At present, there is no formula for the incremental achievement of zero waste. A number of strategies receive recurring mention. Programs such as pay-as-you-throw, multi-stream collection, and incentivized diversion are common discourse among experts and advocates. It is then left to individual communities and organizations to implement these measures in a way that is environmentally as well as operationally and economically sound.

My intention in this report was to provide Teton County with a comparison of zero waste plans from comparable communities. Specifically, to analyze the emphasis of zero waste recommendations on five identified aspects of municipal zero waste

considerations – environmental, social, political, economic, and technological. My expectation was that communities with more established zero waste programming would emphasize more specialized areas of planning, such as advanced technologies and sophisticated economic strategies. In the final analysis, however, while certain communities do employ highly developed infrastructure and strict regulatory frameworks, the primary emphasis across all zero waste plans was placed on the social sphere of influence. The conclusion I drew from this result is that a focus on education, outreach, awareness, and motivation for participation is necessary in all aspects of zero waste programming. This is perhaps a valuable insight for Teton County as it prepares to introduce its initiatives and create a brand for its zero waste mission. The communication it establishes with stakeholders and participants early on may prove as valuable a tool as any facility upgrade or technological enhancement employed in future efforts.

Going forward, Teton County is working to systematically evaluate each proposed zero waste recommendation for its efficacy within the context of local solid waste operations. This involves the evaluation of expected percent diversion as well as the associated costs and revenue potential for each recommendation. The references I identified in this report, including consultant evaluations and national municipal solid waste estimates, provide partial guidance for these determinations. A more thorough understanding of the contribution of each recommendation toward the goal of increased diversion as well as the associated financial impact will determine the final list of recommendations included in the zero waste plan. The recommendations, along with the information concerning percent diversion totals and costs and revenues, are scheduled to be presented to the Board of County Commissioners in July of 2015.

Appendix A. Analysis of Emphasis in Comparable Communities

Fort Collins Plan Recommendation Analysis

Recommendation	Environmental	Social/ Behavioral	Political/ Regulatory	Economic	Technological
Culture Change	Climate change	Culture; Change; Awareness; Signage; Educate; Guidelines; Messages; Outreach; Training; Reinforcement; Assist; Narrative	Adopt; Require; City plan consistency		
	1	2	1	0	0
Reinvest Resources in Local Economy	Reduce greenhouse gases;	Proactive approach; Commitment to purchase locally	Engage the City's economic health staff; local manufacturers listed as suppliers for City purchasing; City plan consistency	Jobs; Demand; Economic health; Financial tools; Create jobs using locally sourced materials; Local manufacture; City Resource Recovery Park	Research and Develop Innovative technologies for reuse, recycling, and composting;
	1	1	2	2	1
Universal Recycling		Update; Expand; Educate; Rename; Additional fee; Double amount of materials; Implement changes smoothly; Consistent message; More services; Provide containers; Shared locking containers; Educational programs and materials;	Require haulers to provide; Recognition by City; Amend land use codes; City plan consistency	Additional fee; Setting rates to accommodate additional services	
	0	2	1	1	0
Prohibited Materials		Phase out; New list	Disposal prohibitions; Adopted; Phase out; City plan consistency		
	0	1	2	0	0
Construction, Deconstruction and Demolition		Training programs for contractors; Additional services/Opportunities for reuse, recycling, composting and deconstruction; On-line resources; "Soft	New/expand building code requirements; Require waste management plan; Building permit	Require deposit to City; Economic development assistance;	

		strip;" Public notification; Salvaging opportunities; Promote deconstruction services; Options to recycle disaster debris	application; Compliance certified; Approval by City official; Require deposit to City; Permit reviews; Public notification; Require fire sprinklers; City plan consistency		
	0	2	2	1	0
Composting Organic Materials		Adopt goal; Phase out; Negative check-off system; Encourage small-scale composters; Facilitate commitment for supply; Pilot programs; Large scale community composting; Backyard bin sales	Require haulers; Publicly sponsored facility; Provide use of City open space; City plan consistency	Economic development tools;	Support development of facility for compostable organics technology; Seal of assurance for quality compost; Explore food scraps digested separately from wastewater solids
	0	2	1	1	2
Reduce & Reuse		Promote; Encourage; Evaluate purchasing practices; Guidelines; Highlight opportunities; Source reduction purchasing practices; More robust program; Help develop; Work with local; Trayless cafeterias; Assist; Support adaptive reuse	City should promote; City financial incentives; Evaluate City purchasing practices; Address liability for donations of food; Code enforcement for illegal dumping; Require secure location for resusable items; Adopt used clothing collection bin ordinance; City plan consistency	Economic benefits of zero waste;	
	0	2	2	1	0
Product Stewardship		Ask businesses; Explore options; Work	Adopt fees; Enact litter fee;	Invest fees in education or	

		to ban plastic water bottles; Ensure clear options; Work with; Provide information; Set up notification group	Invest fees; City plan consistency	funds;	
	0	2	1	1	0
Waste-to-Clean Energy			City continue to investigate; City plan consistency		Hierarchy for evaluation of technology proposals; Prioritize energy technologies to focus on; Encourage research; Pilot innovative technologies; Continue pilot at water reclamation facility
	0	0	1	0	2
Funding		Proceeds for outreach and education	Require haulers to collect fee	Generate revenue through recycling investment fees; Fund new City initiatives; Require haulers to collect; Proceeds for programs; Economic development grants; Loans for reuse, recycling and composting investments; Fee increase; Focus investments to assist in transition to zero waste	
	0	1	1	2	0
Regional Cooperation		Identify locations; Develop facilities; Encourage collaboration; Work with; More than historically has been	Public/private partnerships; Work through Colorado Association for Recycling;	Leverage economies of scale on regional basis	

		done; Explore interest in other communities;	City plan consistency		
	0	2	2	1	0

Boulder Plan Recommendation Analysis

Recommendation	Environmental	Social/Behavioral	Political/Regulatory	Economic	Technological
Support capacity for construction and demolition transfer, sorting and possible processing	Environmentally preferable alternative;	Alternative to disposal; Strategies; Diversion options; Promote facility; Scale up	Control over County-developed site	Affordable; Costs; Study of these costs; Charged on per-ton basis; Current charges; Secure funding; Determine budget needs; Possible jobs;	
	1	2	1	2	0
Require construction and demolition project recycling and reuse	Est. offset 9400 metric tons/year carbon equivalent; Environmental benefits	Opportunity to educate; Encourage; Adopt	Requiring diversion extended to other jurisdictions; Requiring diversion; Tied to permitting; Coordinate between County and cities; Consortium of Cities	Job creation est. 10; Construction cost savings; Market incentive	
	1	1	2	1	0
Clean damaged dimensional lumber should be included in slash management programs	Est. offset 3800 metric tons/year carbon equivalent	Additional drop-off opportunities; Educate municipalities and contractors; Private sector develop mechanisms; Marketing; Pilot program; Outreach	County operated drop-off sites; Monitoring loads; Consortium of Cities	Diversion site operation costs; Job creation est. 7	
	1	2	2	1	0
Support capacity for additional composting	Methane generation avoided by composting; Greenhouse gas reductions; Tie compost to broader climate change	Convenient; Centralized; Analyze best options; Education of collectors and transporters of organic residue; Marketing of compost; Tie compost to broader land, food, and climate	Best compost options for Boulder County; County support private sector	Savings on transport costs; Secure funding source; Determine budget	Feedstocks analyzed - Biosolids not suitable, Increase in food scraps to provide necessary increased

	programs	change programs; Logistical considerations; Feasibility study			nitrogen
	2	2	1	1	1
Provide curbside collection of compostable materials	Est. offset 1260 metric tons/year carbon equivalent; Conserve resources; Reduce potent greenhouse gas	Most effective steps; Reuse compost locally; Expand service; Additional education; Coordinate language, requirements, measurements	Require collection companies to collect; Encourage Consortium of Cities; Adoption of similar measures	Job creation est. 8	Soil health; Agricultural productivity
	1	2	2	1	1
Total at-home composting program	Est. offset 650 metric tons/year carbon equivalent	Increased on-site composting; Supplement compostables collection; Composting workshops; Bin sales; Outreach; Increased education; Homeowner's associations; Targeting residential; Meshes with public and private; Initiatives that encourage; Complements curbside collection; Complements integrate pest management programs; Innovative outreach mechanisms; Measurement of outreach; Consider meetings; Coordinate messages; Develop survey; Evaluate program success; Self-reporting	Relaxing restrictions on backyard compost bins	Funding for outreach; Continue budgeting;	
	1	2	1	1	0
Support opportunities for tree limb management	Est. offset 90 metric tons/year carbon equivalent	Operate drop sites; Share drop sites; Support diversion; Understand benefits; Illustrate the cycle; Opportunities to use; Restricted hours for drop-off; Survey of property-owners; Pilot basis; Requires more study; Possibility of private sector services	Cities to operate drop sites	Drop site costs; Costs have challenged some communities ; Job creation est. 1	

	1	2	1	1	0
Volume-Based residential collection and embedded recycling (Pay As You Throw)	Est. offset 3460 metric tons/year carbon equivalent	Affect residential and businesses; Ongoing promotion; Effectiveness of PAYT; Purchase recycling containers; Measure of annual diversion	Support adoption in additional communities to require PAYT service; Working through Consortium of Cities; Support municipalities	Job creation est. 5.5; Federal funding	
	1	2	2	1	0
Increase Electronics Collection	Est. offset 380 metric tons/year carbon equivalent; Toxic materials	Plan and implement events; Outreach; Provide information; Reminded to dispose responsibly; Pilot project; Data to determine source of discards; Support and measure	City/town coordination with private sector; Issue request for event proposals; Monitor state level producer responsibility developments	Job creation est. 0.5	
	1	2	2	1	0
Offer metal recycling at additional locations	Est. offset 260 metric tons/year carbon equivalent; Greenhouse gas reduction benefits	Offer metal recycling; Create opportunity for drop-off; Strategy; Emphasized to the community; Expansion of facility; Transport needed; Education; Space secured; Implement and promote new system; Monitored quarterly	County to offer metal recycling	Income expected; Capitalize new system	
	1	2	1	1	0
Support commercial food composting	Est. offset 550 metric tons/year carbon equivalent; Significantly lower greenhouse gas impacts	Support commercial food composting; Initiative; Informed about benefits; Transport challenging; Siting of containers; Case studies developed and shared; Voluntary adoption; Introduce businesses; Benefits detailed and shared	Commissioned study; Could mandate commercial compost collection	Competition to reduce costs; Job creation est. 2; Charges for compost collection balanced by lower garbage collection costs; Cost containment largest hurdle; Cost-effective local processing	
	1	2	1	2	0
Commercial Volume-Based	Est. offset 5700 metric	New Zero Waste recognition	Require recycling to be provided;	Job creation est. 7;	

Collection with Enhanced Recycling Programs	tons/year carbon equivalent	component; Affect commercial sector and collection businesses; Extend similar service; Ongoing promotion; Reducing disposal; Purchase trucks and containers; Siting of containers	Collection ordinances structured; Changes to municipal programs	Reducing costs; Initial high cost a primary roadblock	
	1	2	2	2	0
Provide free waste audits for businesses	Est. offset 150 metric tons/year carbon equivalent; Environmental benefits	Technical assistance; Recognition for Zero Waste efforts; Complement additional programs; Opportunity to educate; Educational materials; Free audit; Initiate plan; Diversion goal; Technical assistance; Monitor diversion	County supports Partners for a Clean Environment (PACE)	Cost savings benefits	
	1	2	1	1	0
Land-Use Code Updates – improve commercial and multifamily recycling requirements	Environmental benefits	Developed language; Opportunity to educate;	Revise County Land Use Code; Require equal space; All municipal governments adopt; Tied to permitting; Incorporate into commercial code revision	Cost savings	
	1	1	2	1	0
Municipal contact and advocate	Est. offset 4000 metric tons/year carbon equivalent	Advocate of diversion programs; Designate primary contact; Monitor and promote; Volunteer; Additional advocacy and education; Continuing education for personnel; Document outreach efforts; Evaluate programs; Share successes; Strategies	Designate department or position at each municipality; Governments implement and evaluate; Governments evaluate programs; Share successes; Strategies	Job creation est. 4	
	1	2	2	1	0
Develop “Zero Waste” branding and initiate comprehensive education program	Est. offset 3862 metric tons/year carbon equivalent	Approach to education; Best practices; Link education to successful diversion; Variety of outreach methods; Methods that reduce disposal; Evaluate	Work through County Resource Conservation Division; County campaign		

		effectiveness; Brand recognition; Craft a campaign; Demographic sectors shown to create greatest volumes of waste; Coordinate outreach messages; Evaluate success			
	1	2	1	0	0
Determine Zero Waste funding mechanism		Provide a mechanism; Fund ongoing community outreach and operations; Outreach reduced with revenue decreases	County develop and guarantee funding for waste diversion	Develop and guarantee funding for waste diversion; Fund ongoing community outreach and operations; Secure funding that results in decrease in waste; Decrease in funding expected as Zero Waste programs achieve their goal	
	0	1	1	2	0
Require trees and slash from grubbing and landscaping to be diverted from landfill	Est. offset 1987 metric tons/year carbon equivalent	Opportunity to educate; Use chips as mulch; Encourage through BuildSmart measures; Beneficial distribution of ground material	Require unmarketable wood products left for mulching; Expand BuildSmart requirements	Job creation est. 9	
	1	2	2	1	0
Support ban on yard materials going to landfill	Est. offset 540 metric tons/year carbon equivalent; Reduction in methane generation; Increased state focus on GHG	Support community education; Extended landfill capacity; Infrastructure being strengthened; Provide evidence of materials through study; Create list of yard materials	Feasible state level ban on yard debris from landfill disposal; Existing legislation in 22 states; Increased state focus on GHG; Passage anticipated; Draft legislation at local level; Enforcement mechanisms; Implement ban; Monitor	Job creation est. 20; Reduced collection and transportation costs; Job creation and retention;	

			compliance; Local mechanisms prior to state level		
	1	1	2	1	0
Support ban on food scraps going to landfill	Est. offset 750 metric tons/year carbon equivalent	Capacity exists; Support community education; Links between local food; Infrastructure being strengthened; Provide evidence of materials through study; Create list of food scrap materials	Diversion requirement most effective means; Feasible state level ban in more than decade; Ban independently undertaken by Boulder County; Draft legislation at local level; Enforcement mechanisms; Implement ban; Monitor compliance; Local mechanisms prior to state level	Appropriate pricing structure; Job creation est. 2.5	
	1	1	2	1	0
Support ban on recyclables going to landfill	Est. offset 28,410 metric tons/year carbon equivalent	Outreach necessary; Opposition to ban expected; Costly opposition from landfill operators; Provide evidence of materials through study; Create list of recyclable materials	Local initiation of statewide ban; Support opportunities for local governments to ban additional materials; Political challenges abound; Sate level implementation necessary; Draft legislation at local level; Enforcement mechanisms; Implement ban; Monitor compliance; Local mechanisms prior to state level	Job creation est 33; Costly opposition from landfill operators;	
	1	1	2	1	0
Support multifamily compost collection system	Possible association with GHG reductions;	Support development of collection system; Outreach; Education; Opportunities for landscape applications; Initiated where recycling collection is accepted; Pilot project; Supported with education;	Assistance from municipalities	Economic benefits	
	1	2	1	1	0

Single-stream multifamily recycling collection countywide	Est. offset 760 metric tons/year carbon equivalent	Support recycling service; Pilot project; Efficient messaging; Educational challenges; Branding campaign; How tos; Providing service; Capitalize on zero waste efforts; Begin in communities; Strong education programs; Infrastructure Spread to other complexes; Initiative would extend; Targeted sites; Supplemented by education; Site support; Collection capacity; Evaluate diversion success	County/Cities support recycling service; Commissioned by the City;	Job creation est. 9; Evaluate cost effectiveness	
	1	2	1	1	0
Secure Advanced Disposal Fees on priority items	Est. offset 679 metric tons/year carbon equivalent	Priority items; Reduce use; Education; Campaign launch; Notice of fee implementation; Prepare for the change; Zero waste progress monitored through fee collection	Board of County Commissioners adopted; Guided by Boulder County Product Stewardship Plan; Local authority to collect fee; Pursue fee collection at state level;	Job creation est. 1; Pay for proper management ; Offset costs of hazardous materials management ; Develop accounting mechanism	
	1	2	2	2	0
Provide zero waste building planning assistance	Est. offset 590 metric tons/year carbon equivalent	Intensive education; Outreach program; Obtain 1% diversion; Technical assistance Models of successful business; Demonstrate social norms; Emphasize cost savings along with information; Targeted outreach; Increase waste diversion; Similar programs exist		Job creation est. 1; Emphasize cost savings	
	1	2	0	1	0
Require Zero Waste planning for large events on public property	Est. offset 2 metric tons/year carbon equivalent	Zero Waste not currently required; Educational for attendees; Demonstrate commitment to zero waste; Provide concrete examples;	Require permitted event to submit zero waste plan; Require deposit; Compliance documented following event; Adopt	Deposits directed to a County fund; Adopt accounting systems	

		Value of education greater than diversion potential; Standardize services and education; Provide checklist of required zero waste elements	permitting/accounting systems; Educate permitting staff		
	1	2	2	1	0
Promote markets for county-generated recyclables and compost		Ongoing analysis and development of markets; Support more local uses; Certainty that diversion programs are generating new products and cost-effective end uses; Not every resident understands; Provides evidence; Elements of program strengthened; New feedstocks; Increased volumes; Verify current; Study projected; Monitor and research; Assist manufacturers; Target local companies; Enlist support; Get press (promote) companies that manufacture/process/sell recycled materials	Follow Clean Washington Center recommendations;	Liaison with economic development; Certainty of cost-effective end uses through diversion; Cooperation with economic development agencies	
	0	2	1	1	0
Support Product Stewardship initiatives, including Extended Producer Responsibility at the state and local level		Consumers begin to realize and demand; Possible but challenging;	Support state product stewardship initiatives; Based on national initiatives; Progress in Colorado hinge on success in other states; Measures considered at legislative level; Board of County Commissioners adopted; Guided by Boulder County Product Stewardship Plan; Support stewardship committee within Colorado Association for Recycling		

	0	1	2	0	0

San Francisco Plan Recommendation Analysis

Banning the use of Styrofoam and other brands of polystyrene foam in City departments and by food service operators			Banning		
	0	0	2	0	0
Banning the use of non-compostable plastic bags		Groundbreaking step; Followed by over 40 municipalities	Banning; A court-upheld action; Supported by Clean Seas Coalition		
	0	1	2	0	0
Requiring every event held in San Francisco to offer recycling and composting		Provide marked bins; Arranging for collection	Requiring		
	0	2	2	0	0
Reducing packaging		Collaboration with legislators, producers, wholesalers, retailers, consumers	Collaboration with legislators		
	0	2	1	0	0
Reducing GHG emissions from food	GHG emissions; Less carbon-intensive foods	Campaigns; Education; Emphasize switch; Reducing food waste	Legislation		
	1	2	1	0	0
Reducing consumption	Less carbon-intensive products	Campaigns; Education; Consuming fewer products; Encourage sharing economy; Support efficient production	Legislation		
	1	2	1	0	0
Increasing diversion of			Implementation of Construction and		

construction and demolition material			Demolition Debris Recovery Ordinance		
	0	0	2	0	0
Supporting the expansion of producer responsibility laws			Expansion of laws		
	0	0	2	0	0
Strengthen compliance with mandatory source separation of recyclable and compostable materials		Continuing outreach and assistance	Strengthen compliance		
	0	2	2	0	0
Developing a zero waste facility				Reduce operational costs	Increase material processing efficiencies; Recover non-source separated compostables and recyclables
	0	0	0	1	2
Utilizing anaerobic digestion					Utilizing anaerobic digestion of food-rich material; Recover from ource separated and mixed waste; Produce biogas for fuel
	0	0	0	0	2
Working to develop the secondary materials market for recyclables, compostables, and their post processed derivatives		Working with local, national, and international businesses and institutions		Develop secondary materials market	
	0	1	0	2	0
Decreasing use of disposable		Conducting upstream waste prevention campaigns	Material bans		

products					
	0	2	2	0	0
Increasing reuse, recycling, composting, and recycled content of products through producer responsibility initiatives		Increase reuse, recycling, composting, and recycled content; Producer responsibility initiatives			
	0	2	0	0	0

Salt Lake City Plan Recommendation Analysis

Improve price incentives to reduce waste and increase recycling				Increase price differences between garbage can sizes	
	0	0	0	2	0
Engage residents and businesses in waste reduction and recycling		Develop; Implement outreach plan; Reduce waste and increase recycling; Reduce waste landfilled by 10%			
	0	2	0	0	0
Reduce contamination of recyclables and compost by actively enforcing refuse code			Actively enforcing refuse code		
	0	0	2	0	0
Increase glass recycling through drop-off and curbside collection		Drop-off and curbside collection			
	0	2	0	0	0
Develop capacity for composting or recovering energy from food scraps		Expand curbside compost program			Incorporate food scraps recovery into composting/energy recovery facility

and other compostables					
	0	2	0	0	2
Evaluate every-other-week garbage collection		Feasibility study; Reduce home garbage collection frequency			
	0	2	0	0	0
Explore incentives and requirements to increase commercial recycling		Develop plan	Adopt plan if recommended; Code changes if needed		
	0	2	1	0	0
Increase recycling of construction and demolition materials			Adopt and implement requirement		
	0	0	2	0	0

Austin, Texas Plan Recommendation Analysis

Require Producers to Take Responsibility for Products	Toxic in their manufacture, use, disposal	Engage industry; Aware of materials and products; Establish a process; Encourage businesses and institutions; Not currently recyclable; Promote EPR; Establish centers to receive; Develop public-private parternship; Evaluate similar programs	Advocate for legislation; Regionally, statewide, nationally; Expand existing City resolution; Adopt new resolution; Texas Stewardship Council; Work with other local governments; Authorize local governments; Ban products or packaging; Join with other local governments; Require businesses and institutions to take back; Develop public-private parternship		
	1	2	2	0	0

Lead by example. Reduce/recycle City of Austin agency waste.		Evaluate incentives; Encourage recycling; Offer recognition; Evaluate education and outreach; Increase participation; Communicate information; Establish green teams; Recommend improvements; Educate employees; Use color and graphics; Provide single stream recycling to City offices; Train managers and staff; Place bins; Include organics bins	Require public events and venues to implement zero waste; Require City solid waste contracts; Review current City purchasing practices; Adopt Precautionary Principle for City purchases; Require City facilities and projects to use local mulch and compost; Require recycled materials in City projects; Require buildings with City lease to provide space for recycling; Stop incentives to landfill (i.e. landfill gas as green energy)	Incentives given to landfills makes Zero Waste less economic.	
	0	2	2	1	0
Reduce waste from single family homes		Evaluate rate structure; Greater incentive to reduce wastes; Linear Pay-As-You-Throw; Evaluate; Less frequent; Pilot program; Establish rules; Develop Resource Recovery Parks to accept all 12 categories; Provide locations; Partner with organizations and businesses; Add residential organics collection program; Pilot program; Tour other communities	Adopt policy no organics to landfill; Encourage Capital Area Council of Governments; Partner with organizations and businesses; Require RRR of bulky item collection	Evaluate rate structure for incentives; Linear Pay-As-You-Throw; Evaluate lower rates for less frequent garbage collection; Fund local reuse facilities	
	0	2	1	1	0
Reduce waste from commercial, multi-family, and institutional entities		Educate about new rules and changes; Reinvigorate; Advocates in the community; Train students; Outreach to local businesses; Social marketing campaign; Explore	Implement City's recycling ordinance; Require multi-family, businesses and institutions to recycle and compost; Regulatory system	Set fees to provide economic incentive for recycling; Generate funds for Zero Waste programs; Fund programs to	

		ways to encourage; Use resource management techniques; Ask businesses to implement zero waste goals; Promote reuse businesses; Develop and update reuse guide; Designate reuse zones; Pilot food scraps program; Market urban organics for farm use; Evaluate waste management plans; Agreed upon goals; Recognition programs; Partner with nonprofits for drop-off, recycling clusters; Develop processing facilities for local reuse	for waste hauling; Require waste haulers provide equal recycling and garbage container service through permitting; Work with permitting agencies to allow farmers to use local organics	evaluate waste management plans	
	0	2	1	1	0
Reduce waste from development projects		Work with Austin Green Energy Building Program to revise recycling and reuse goals; Develop programs to approve waste management plans; Monitor data from construction projects; Recognize projects that achieve diversion goals	Require contractors and developers to certify 50% materials diversion for City projects; Require waste management plans; Require deposits	Return portion of fees/deposits for based on percentage of diversion; Fund programs to approve waste management plans	
	0	2	2	1	0
Develop and invest in Zero Waste infrastructure		Include zero waste infrastructure needs as part of local climate action plans; Need to be done very carefully; High standards for design to be compatible with neighborhoods; Partnerships with private, nonprofit; Evaluation, Identify current infrastructure; Job training programs	Include zero waste infrastructure needs as part of local climate action plans; Modify zoning code to facilitate zero waste infrastructure; Partnerships with private, nonprofit	Support continuation and expansion of fees and bond issues to fund and develop programs and infrastructure	
	0	2	1	1	0

Enlist region to support Austin Zero Waste efforts		Work with school districts; Integrate Zero Waste into curriculum; Implement Zero Waste systems for all schools; Include mulch and compost from urban organics in regional Dept. of Transportation specifications; Better planning in the future;	Implement Zero Waste systems for all schools; Ask regional Dept. of Transportation to include urban organics; Ask Capital Area Council of Governments to adopt zero waste as a goal; Support needed state legislative initiatives; Require landfill to confirm and report to Texas Commission on Environmental Quality; Ask State to require all landfill areas to have recovery park for all categories of reuse, recycle, compostable materials; Require Resource Recovery Park in NE Travis County	Fund initiatives with landfill surcharges	
	0	1	2	1	0
Retain and Expand Green Businesses and Green Collar Jobs	Buy less toxic products	Procurement, funding, permitting preferences for certified green businesses; Encourage purchase of zero waste products and services; Return to vendor packaging; Reduce packaging; Reusable shipping containers; Purchase reused, recycled, composted; buy remanufactured equipment; Share equipment; Buy durables; Use life-cycle cost analysis; Businesses adopt zero waste goals and plans; Green collar job training and certification courses; Continuing	Permitting preferences for certified green businesses; “Go to head of line” permits for zero waste businesses; Adopt Precautionary Principle for City purchases; Require City to purchase zero waste products and services	Use life-cycle cost analysis; Start-up grants, loans for zero waste infrastructure; Portion of Workforce Development funds for green job training and wages	Green product/process R&D;

		education courses; Support "think pads" to stay on cutting edge of zero waste practices;			
	1	2	1	1	1
Encourage Green Building Construction Standards	Sensitive karst limestone geology	Encourage restoration of buildings; Promote residential developments that are certified as green buildings; Maximum deconstruction can be arranged; Contractor and subs training on C&D reuse and recycling; Work with Austin Green Building Program; Base success on value of materials, not weight; Evaluate adding zero waste as bonus point; base Green Building status on % diverted from facilities, not weight per project; Evaluate and establish certification to meet both Green Building and Zero Waste goals	Levy mitigation fees on high impact facilities; "Go to head of line" permits for zero waste businesses; Expand required Green Building standards; Check-off box on permit renewal requirements for Green Building and Zero Waste projects; Require advertising of demolition; Require contractor training through permitting; Require adequate space for recycle and compost in all new construction, and provision for organics; Prohibit landfilling C&D once infrastructure available;	"Go to head of line" funding for zero waste businesses	Best available control technology for on-site crushing of recycled materials
	1	2	2	1	1

Teton County Draft Plan Recommendation Analysis

Recommendation	**Environmental**	**Social/ Behavioral**	**Political/ Regulatory**	**Economic**	**Technological**
Community Recycling Survey		Awareness; outreach			
	0	2	0	0	0
Track Residential vs. Commercial Waste at Trash Transfer Station		Track			
	0	2	0	0	0
Tiered Tip Fees		Incentivize		Fees; Incentivize diversion	

	0	1	0	2	0
Develop Zero Waste Branding for Teton County		Develop branding			
	0	2	0	0	0
Provide Initial Guidance and Resources for Zero Waste Planning by Commercial Businesses		Guidance; Resources; Planning			
	0	2	0	0	0
Provide ZW Event Toolkits and Instruction		Suggestions; Bins; Signage; Elimination	Compliance; Solid waste requirements		
	0	2	1	0	0
Establish Town/County Purchasing Policies to Encourage Waste Reduction through Waste Avoidance, Reuse, and Recycling		Establish; Encourage; Policies	Town/County ; Policies		
	0	2	1	0	0
Online Directory of Reuse/Repair Resources		Resources; Create; Promote; Resource-sharing; Resources; Facilitate; Cooperative			
	0	2	0	0	0
Support the Town of Jackson in Establishing a Fee on the Use of Plastic Bags by Retail and Food Service Businesses		Support; Establishing; Suggested	Prohibited	Fee; Fund	
	0	2	1	2	0
Recognition Program for Zero Waste Plans by Commercial Businesses		Recognition; Plans; Model zero waste; Certification program			
	0	2	0	0	0
Building Code Requirements for Equal Recycling Space		Equal space; Coordinate	Requirement; Building Codes;		
	0	1	2	0	0
Require ZW Planning for		Planning; Instructional signage; Elimination	Require; Permits		

Events Requiring Town/County Permits					
	0	1	2	0	0
Explore Residential Single-Family PAYT Ordinance		Explore; Enacted; Agreement with haulers	Town franchise agreement with haulers		
	0	2	2	0	0
Explore Residential Multi-Family PAYT Ordinance		Explore; Enacted; Agreement with haulers	Town franchise agreement with haulers		
	0	2	2	0	0
Implement Residential Single-Family PAYT Ordinance		Enacted; Agreement with haulers	Implement; Town franchise agreement with haulers		
	0	1	2	0	0
Implement Residential Multi-Family PAYT Ordinan		Enacted; Agreement with haulers	Implement; Town franchise agreement with haulers		
	0	1	2	0	0
Education and Awareness to Increase Recovery of Materials Currently Accepted for Recycling		Education; Awareness; Increase recovery; Identify; Outreach; Capacity; Currently accepted		Market feasibility	
	0	2	0	1	0
Expand Materials Accepted for Recycling		Identify; Feasible; Beneficial; Initiate acceptance		Market feasibility	
	0	2	0	0	0
Municipal Bins for Recycling of Commercial Corrugated Cardboard		Establishment of bins; Provide infrastructure; Operations		Disposal fees charged	
	0	2	0	1	0
Accept Co-mingled Recycling Stream (Single of Dual)		Outreach; Facility; Processing; Separation; Necessary			
	0	2	0	0	0
Curbside Collection of Co-mingled Recyclables from Residential, Multi-family, and Commercial		Curbside collection	Condition of franchise agreement	Disposal surcharge	

Customers					
	0	2	2	1	0
Mandatory Recycling of Residential Cardboard		Separation	Mandatory; Require		
	0	1	2	0	0
ABC Ordinance			Ordinance; Require; Permit holders		
	0	0	2	0	0
Continue and Expand Seasonal And Special Event Composting Programs		Continue; Expand; Seasonal; Programs; Promote; Participation; Awareness			
	0	2	0	0	0
Establish Master Composter Certification Program		Establish; Certification program; Create; Train; Community leaders; Advocate; Increased practices			
	0	2	0	0	0
Require Commercial Landscapers to Compost Yard Waste Materials		Compost yard waste	Require		
	0	1	2	0	0
Consider Card Swipe Technology for Residential Yard Waste Bins		Consider; Pursue opportunities/collaborations		Grant opportunities	Card swipe technology
	0	1	0	1	2
Complete Survey of Commercial Food Waste Recovery Program		Survey; Identify interest; Feasibility			
	0	2	0	0	0
Construction and Operation of Expanded Composting Facility		Construction scheduled; Implementation; Expansion; Compost operations; Additional capacity; Introduction			Compost operations
	0	2	0	0	1
Ensure Opportunity for Collection of Commercial Food Waste		Ensure opportunity; Collection services; Private haulers			
	0	2	0	0	0
Ban Disposal of			Ban		

Yard Waste in Landfill					
	0	0	2	0	0
Recognition Opportunity for Zero Waste Construction		Recognition opportunity; Establish; Identify; Examples			
	0	2	0	0	0
Model Building Site		Model; Demonstration			
	0	2	0	0	0
C&D Deposit Incentive		Incentive	Deposit required; Designated percentage	Deposit	
	0	1	2	1	0
Required Diversion of C&D Materials			Required diversion; Certain percentage		
	0	0	2	0	0

Appendix B. Initial List of Zero Waste Categories

Sort by waste stream?
Aluminum
Tin
Plastics
Glass
Cardboard
Paper
Magazines
Newspaper
Organics
  Food Waste
  Yard Waste
C&D
Scrap Metal
Textiles
Electronics
HHW
Other
  Mattresses
  Furniture
Waste Avoidance

Sort by Timeline?
Short Term
  0-2 years
Mid Term
  2-5 years
Long Term
  6 years or more

Sort by % Diversion?
Initial 10%
20-30% Diversion
40-60% Diversion
Beyond 60%

Sort by guiding principle?
Manage resources instead of waste

Conserve natural resources through waste prevention and recycling

Turn discarded resources into jobs and new products instead of trash

Promote products and materials that are durable and recyclable

Discourage products and materials that can only become trash after their use

Use education as a tool to maximize community engagement

Sort by Sector?
ISWR Facility
Commercial
Residential SF
Residential MF
Government
Regulation/Ordinance

Sort by Action?

Recycling
Composting
Reuse/Repurpose
Regulation/
  Ordinance
Waste Avoidance
ISWR Operations/
  Facilities

Sort by Sector and Stream

Appendix C. Initial List of Zero Waste Recommendations

Recommendation
Encourage businesses and commercial facilities to prepare recycling plans.
Require businesses and commercial facilities to prepare recycling plans.
Landscapers for commercial properties required to compost, or drop-off for compost, their yard waste materials.
Pilot programs to compost food waste in schools, institutions, commercial facilities.
Ban yard waste from landfill.
Ban food waste from landfill.
Ordinance banning residential disposal of yard waste in trash.
Incentives and education for backyard composting. Master composter training.
Encourage expansion of backyard composting through outreach and education via homeowner's associations – workshops, bin sales, etc…
Curbside yard waste collection. (Hauler requirements? SF+MF or is MF with commercial?)
Curbside food waste collection. (Hauler requirements? SF+MF?)
Require County/Town landscaping to be done using local compost.
Disposal surcharge at transfer station for haulers not offering residential curbside recycling service.
Ordinance requiring haulers to report annual amounts of garbage, compost, and recycling.
Model Building Site as an example of zero waste C&D practices
Recognize achievements of ZW businesses through local certification program.
Commercial PAYT ordinance with recycling embedded.
Provide ZW event toolkits and instruction in conjunction with approval of Town/County event permits.
Adopt ZW goals for public events that require Town/County permits (i.e. recycling bins, compost bins, instructional signage, elimination of single use beverage containers, etc…)
Require zero waste planning for events at public facilities.
Develop Zero Waste branding for Teton County.
Utilize education and outreach to promote zero waste plan concepts.
Create Master Recycler certification to train residents who can advocate for local ZW practices.
Determine funding mechanism for ongoing waste diversion programs.
Expand cooperative service/coordination for commercial recycling of corrugated cardboard.

Require commercial recycling of corrugated cardboard.
Expand cooperative service/coordination for commercial recycling of glass and aluminum.
ABC Ordinance - require commercial recycling of glass, aluminum, plastic by alcoholic beverage permit holders.
C&D Deposit incentive – deposit required of builders/developers refunded when waste materials delivered to certified C&D sorting MRF or 35% C&D materials recycled.
Require C&D projects to recover 75% (??) of materials.
Commercial recycling pickup. (Hauler requirements?)
Exclude glass from commingled recycling stream. Glass accepted in source separated collection.
Expand plastics recycling to include #3-7.
Upgrade existing 14,000 sq ft recycling center to accommodate future MRF needs.
Expand ISWR Facility to manage 70% co-mingled/30% source separated recyclables.
Single stream recycling.
Sorting equipment at ISWR Facility.
Expand electronics collection?
Ban recyclables from landfill.
Require equal space for garbage and recycling in building codes for new construction and significant remodels of Residential SF, Residential MF, Commercial properties.
Residential SF and MF recycling pickup. (Hauler requirements?)
PAYT ordinance with recycling embedded.
Establish a Build Smart/Green Build program that includes recycling of cardboard, concrete, scrap metal and clean wood at construction projects.
Establish a Build Smart/Green Build program that includes salvage of reusable cabinets, doors, windows, flooring, fixtures, and clean lumber.
Expanded/Additional drop-off locations for scrap metal and other construction materials for recycling, reuse.
Encourage food donation programs at homes, schools, businesses, institutions. JH Food Rescue?
Promote thrift stores, material swaps, and other reuse practices throughout community.
Ordinance requiring publication of demolition permits to inform deconstruction firms.
Promote markets of reusable goods through bargain basements in retail stores, used lumber and building material resale, compost, and used appliances and furniture.

Encourage businesses in innovative product reuse, repurposing, recycling.
Program to minimize wood waste by encouraging the resale/donation of used and damaged clean lumber as scrap wood bundles and wood for fuel.
Promote reuse and repair online directory to facilitate cooperative reuse and repurposing of materials.
Plastic bag ban.
Impose litter fee on packaging items that are difficult to reuse, recycle, compost: paper bags, plastic bags, polystyrene takeout containers.
Encourage businesses and institutions to take back products and packaging sold in Teton County that are toxic in their disposal and/or not recyclable in the area.
Advocate for Extended Producer Responsibility legislation.
Mandate Extended Producer Responsibility legislation.
Identify potential revisions to town/county purchasing policies to encourage waste reduction through recycling and reuse.
Tiered tip fees at Trash Transfer Station with higher rates for less desirable materials.

Appendix D. Zero Waste Recommendations Sorted and Coded

Color Code: *Tan = Administrative/Operational Recommendations* ***Purple*** *= Pay As You Throw* ***Blue*** *= Recycling* ***Green*** *= Composting* ***Orange*** *= C&D*

Short Term Recommendations *0-3 Years*	**Sector**	**Stream**	**Action**	**Voluntary-Mandatory**
Waste Audit at Trash Transfer Station	ISWR	Multiple	n/a	n/a
Community Recycling Survey	ISWR	n/a	n/a	V
Track Residential vs. Commercial MSW at Trash Transfer Station.	ISWR	Multiple	Facilities/Operations	M
Tiered Tip Fees Continue to offer tiered tip fees to financially incentivize waste diversion.	ISWR	Multiple	Facilities/Operations	M
Develop Zero Waste Branding for Teton County	ISWR	Multiple	Education/Outreach	V
Provide Initial Guidance and Resources for Zero Waste Planning by Commercial Businesses Provide information and assistance to commercial businesses concerning zero waste operations and upcoming zero waste recognition opportunities. (Free?) Zero waste audits for businesses?	ISWR	Multiple	Education/Outreach	V
Provide ZW Event Toolkits and Instruction In conjunction with approval of Town/County event permits. Toolkit suggestions include recycling bins, compost bins, instructional signage, elimination of single use beverage containers, etc… [Possible link with ABC Ordinance?]	Government	Multiple	Multiple	V

Establish Town/County Purchasing Policies to Encourage Waste Reduction through Waste Avoidance, Reuse, and Recycling	Government	Multiple	Waste Avoidance	V
Online Directory of Reuse/Repair Resources Create or promote an existing online directory of reuse, repair, and resource-sharing services to facilitate cooperative reuse and repurposing of materials (i.e. freecycle.org). Link to resource page on RRR site.	ISWR	Multiple	Reuse Education/Outreach	V
Enact a Fee on the Use of Plastic Bags by Retail and Food Service Businesses Suggested fee $.05 to $.10. Half of fee paid to store and half designated for solid waste related fund tbd. [Alternative wording: "Reusable Bag Ordinance" Retail stores prohibited from using single-use plastic carryout bags and may sell paper or reusable bags for a small charge.]	Commercial	Plastic Bags	Waste Avoidance	M
Explore Residential Single-Family PAYT Ordinance Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.	Residential SF	Multiple	Recycling Composting Waste Avoidance	M
Explore Residential Multi-Family PAYT Ordinance Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.	Residential MF	Multiple	Recycling Composting Waste Avoidance	M
Expand Materials Accepted for Recycling (i.e. durable plastics, paperboard, electronics, bulky items: mattresses, carpet, carpet pad, asphalt shingles, gypsum board, etc...) QUESTION: more specific timeline for acceptance of each material?	ISWR	Multiple	Facilities/Operations Recycling	n/a
Expand Commercial Recycling of Corrugated Cardboard Expand cooperative service/coordination for commercial recycling of corrugated cardboard. QUESTION: Combination/coordination with ABC Ordinance?	Commercial	Corrugated Cardboard	Recycling	V

Continue and Expand Seasonal and Special Event Composting Programs Provide composting during community events such as Old Bill's Fun Run. Promote composting participation and awareness with seasonal composting events such as Halloween Pumpkin Chucking and Christmas tree composting.	ISWR	yard waste food waste	Education/Outreach Composting	V
Establish Master Composter Certification Program Create a Master Composter certification to train residents and community leaders who can advocate for increased composting practices.	ISWR	Multiple	Education/Outreach	V
Establish Community Collection Sites for Residential Yard Waste QUESTION: Will this become curbside collection in Mid-Term? See Mid-term.	Residential	Yard Waste	Composting	V
Recognition Opportunity for Zero Waste Construction Establish a program that recognizes construction projects that Recycle: cardboard, concrete, scrap metal and clean wood Salvage: reusable cabinets, doors, windows, flooring, fixtures, and clean lumber Donate/Resale: clean lumber as scrap wood bundles or wood for fuel.	Commercial	C&D	Education/Outreach Recycling Reuse	V
Mid-Term Recommendations **4-8 *Years***				
Waste Audit at Trash Transfer Station	ISWR	Multiple	n/a	n/a
Recognition Program for Zero Waste Plans by Commercial Businesses RRR Business Leaders to model zero waste planning; Recognize achievements of zero waste businesses; Zero Waste Business certification program	Commercial	Multiple	Education/Outreach	V
Building Code Requirement for Equal Recycling Space Require equal space for garbage and recycling in building codes for new construction and significant remodels of Residential SF, Residential MF,	Commercial	Multiple	Recycling	M

Commercial properties. Note: Coordinate space required with shift to co-mingled recyclables?				
Implement Residential Single-Family PAYT Ordinance Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.	Residential SF	Multiple	Recycling Composting Waste Avoidance	M
Implement Residential Multi-Family PAYT Ordinance Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.	Residential MF	Multiple	Recycling Composting Waste Avoidance	M
Continue Expansion of Materials Accepted for Recycling *Ongoing expansion of materials accepted for recycling (i.e. durable plastics, paperboard, electronics, bulky items: mattresses, carpet, carpet pad, asphalt shingles, gypsum board, etc...)* *QUESTION: see question above*	ISWR	Multiple	Facilities/Operations Recycling	n/a
Require Commercial Recycling of Corrugated Cardboard	Commercial	Corrugated Cardboard	Recycling	M
Continue to Plan, Fund and Implement Expanded Yard Waste and New Food Waste Composting Facility and Program Facility construction planned summer 2020.	ISWR	yard waste food waste	Facilities/Operations	V
Ensure Opportunity for Collection of Residential Yard Waste QUESTION: Progression to curbside collection or limited to community collection sites? See Short term.	Residential	Yard Waste	Facilities/Operations	V
Require Commercial Landscapers to Compost Yard Waste Materials Including Jackson/Teton County Parks and Rec and other large entities.	Commercial	Yard Waste	Composting	M
Model Building Site Designated building site serves as a demonstration site for zero waste C&D practices.	Commercial	C&D	Education/Outreach	V

Long-Term Recommendations ***9-15 Years***				
Waste Audit at Trash Transfer Station	ISWR	Multiple	n/a	n/a
Require ZW Planning for Events Requiring Town/County Permits Zero waste event planning to include recycling bins, compost bins, instructional signage, elimination of single use beverage containers, etc…	Government	Multiple	Multiple	M
Continue Expansion of Materials Accepted for Recycling *Ongoing expansion of materials accepted for recycling (i.e. durable plastics, paperboard, electronics, bulky items: mattresses, carpet, carpet pad, asphalt shingles, gypsum board, etc…)* *QUESTION: see question above*	ISWR	Multiple	Facilities/Operations Recycling	n/a
Accept Co-mingled Recycling Stream Accept co-mingled recyclables from residential and commercial customers through drop-off and curbside collection.	ISWR	Multiple	Facilities/Operations Recycling	n/a
Ensure Opportunity for Collection of Co-mingled Recyclables from Residential, Multi-family, and Commercial Customers (i.e. disposal surcharge at trash transfer station for haulers not offering recycling service; as condition of franchise agreement; etc…)	ISWR	Multiple	Facilities/Operations	V
ABC Ordinance Require commercial recycling of glass, aluminum, and plastic by alcoholic beverage service permit holders.	Commercial	Glass Plastic Aluminum	Recycling	M
Continue to Plan, Fund and Implement Expanded Yard Waste and New Food Waste Composting Facility and Program Facility construction planned summer 2020.	ISWR	yard waste food waste	Facilities/Operations	V
Ensure Opportunity for Collection of Commercial Food Waste Initiate pilot program; issue RFP and negotiate contract with private hauler	ISWR	Food Waste	Facilities/Operations	V

C&D Deposit incentive A materials deposit is required of builders/developers. It is refunded when waste materials are delivered to certified C&D sorting MRF or when a designated percentage (i.e. 35-75%) of C&D materials are recycled.	Commercial	C&D	Recycling	M
Required Diversion of C&D Materials Require C&D projects to recover a certain percentage (i.e. 35-75%) of materials.	Commercial	C&D	Recycling	M

Appendix E. Current Version of Zero Waste Recommendations_031415

Time Frame	Administrative Zero Waste Recommendations
S	*Community Recycling Survey*
S	*Track Residential vs. Commercial MSW at Trash Transfer Station.*
S	*Tiered Tip Fees* Continue to offer tiered tip fees to financially incentivize waste diversion.
S	*Develop Zero Waste Branding for Teton County*
S	*Provide Initial Guidance and Resources for Zero Waste Planning by Commercial Businesses* Provide information and assistance to commercial businesses concerning zero waste operations and upcoming zero waste recognition opportunities. (Free?) Zero waste audits for businesses?
S	*Provide ZW Event Toolkits and Instruction* Toolkits to enhance/facilitate compliance with Town/County solid waste requirements for events. Toolkit suggestions include recycling bins, compost bins, instructional signage, elimination of single use beverage containers, etc… [Possible link with ABC Ordinance?]
S	*Establish Town/County Purchasing Policies to Encourage Waste Reduction through Waste Avoidance, Reuse, and Recycling*
S	*Online Directory of Reuse/Repair Resources* Create or promote an existing online directory of reuse, repair, and resource-sharing services to facilitate cooperative reuse and repurposing of materials (i.e. freecycle.org). Link to resource page on RRR site.
S	*Support the Town of Jackson in Establishing a Fee on the Use of Plastic Bags by Retail and Food Service Businesses* Suggested fee $.05 to $.10. Half of fee paid to store and half designated for solid waste related fund tbd. [Alternative wording: "Reusable Bag Ordinance" Retail stores prohibited from using single-use plastic carryout bags and may sell paper or reusable bags for a small charge.]
M	*Recognition Program for Zero Waste Plans by Commercial Businesses* RRR Business Leaders to model zero waste planning; Recognize achievements of zero waste businesses; Zero Waste Business certification program
M	*Building Code Requirement for Equal Recycling Space* Require equal space for garbage and recycling in building codes for new construction and significant remodels of Residential SF, Residential MF, Commercial properties. Note: Coordinate space required with shift to co-mingled recyclables?

L	*Require ZW Planning for Events Requiring Town/County Permits* Zero waste event planning to include recycling bins, compost bins, instructional signage, elimination of single use beverage containers, etc…

Time Frame	PAYT Zero Waste Recommendations
S	*Explore Residential Single-Family PAYT Ordinance* Will be enacted through TOJ franchise agreement with haulers. Charges TBD.
S	*Explore Residential Multi-Family PAYT Ordinance* Will be enacted through TOJ franchise agreement with haulers. Charges TBD.
M	*Implement Residential Single-Family PAYT Ordinance* Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.
M	*Implement Residential Multi-Family PAYT Ordinance* Will be enacted through TOJ franchise arrangement with haulers. Charges TBD.

Time Frame	Recycling Zero Waste Recommendations
S	*Education and Awareness to Increase Recovery of Materials Currently Accepted for Recycling* Identify outreach, processing and storage capacity, and market feasibility for increased recycling of currently accepted materials.
S	*Expand Materials Accepted for Recycling* Identify additional materials (i.e. durable plastics, paper cartons, other paperboard packaging) for which it would be feasible and beneficial to initiate acceptance for recycling.

M	*Municipal Bins for Recycling of Commercial Corrugated Cardboard* Bins for corrugated cardboard collection located throughout the community. Disposal fees possibly charged through County utility, correlated with energy usage/square footage/other metric or billed through haulers. Establishment of bins will provide infrastructure and operations for mandatory recycling of commercial corrugated cardboard.
L	*Accept Co-mingled Recycling Stream (Single or Dual Stream)* Provide outreach, facility, and processing of co-mingled recyclables. Dual stream will require separation of mixed paper. Single stream operations will not require separation of paper. Separation of glass and corrugated cardboard will continue to be necessary.
L	*Curbside Collection of Co-mingled Recyclables from Residential, Multi-family, and Commercial Customers* (i.e. disposal surcharge at trash transfer station for haulers not offering recycling service; as condition of franchise agreement; etc...)
L	*Mandatory Recycling of Residential Cardboard* Require separation and recycling of corrugated cardboard by residential solid waste customers.
L	*ABC Ordinance* Require commercial recycling of glass, aluminum, and plastic by alcoholic beverage service permit holders.

Time Frame	**Composting Zero Waste Recommendations**
S	*Continue and Expand Seasonal and Special Event Composting Programs* Promote yard waste composting participation and awareness with seasonal composting events such as Halloween Pumpkin Chucking and Christmas tree composting.
S	*Establish Master Composter Certification Program* Create a Master Composter certification to train residents and community leaders who can advocate for increased composting practices.
S	*Require Commercial Landscapers to Compost Yard Waste Materials* Including Jackson/Teton County Parks and Rec and other large entities.
S	*Consider Card Swipe Technology for Residential Yard Waste Bins* Pursue grant opportunities/research collaborations/existing technologies for card swipe bins placed in residential areas that will allow individual disposal of designated volumes of yard waste. Example technology: http://www.theguardian.com/sustainable-business/south-korea-swipe-card-food-waste

S	*Complete Survey of Commercial Food Waste Recovery Program* Identify interest and feasibility of food waste recovery program in local commercial food industry.
M	*Construction and Operation of Expanded Composting Facility* Construction scheduled for completion summer 2020. Implementation and expansion of compost operations will include additional yard waste capacity as well as introduction of food waste capacity.
L	*Ensure Opportunity for Collection of Commercial Food Waste* Private haulers will provide collection services for commercial food waste.
L	*Ban disposal of yard waste in landfill*

Time Frame	**C&D Zero Waste Recommendations**
S	*Recognition Opportunity for Zero Waste Construction* Establish a local program and/or identify national program (i.e. USGBC, etc...) that recognizes construction related waste diversion practices. Examples include: Recycling of cardboard, concrete, scrap metal and clean wood; Repurposing of cabinets, doors, windows, flooring, fixtures, and clean lumber; and Donation/Resale of clean lumber as scrap wood bundles or wood for fuel.
M	*Model Building Site* Designated building site serves as a demonstration site for zero waste C&D practices.
L	*C&D Deposit incentive* A materials deposit is required of builders/developers. It is refunded when waste materials are delivered to certified C&D sorting MRF or when a designated percentage (i.e. 35-75%) of C&D materials are recycled.
L	*Required Diversion of C&D Materials* Require C&D projects to recover a certain percentage (i.e. 35-75%) of materials.

Appendix F. Zero Waste Recommendation Template

Recommendation #:

Short/medium/long term:

Targeted sector of the community (i.e. commercial, residential, visitor, etc.):

Current status:

Summary of recommendation:

- **Category:**
- **Voluntary or Mandatory:**
- **Diversion Potential:**
- **Expenses/revenues**
    a. **Expenses**
        - Capital:
        - Operational:
        - Decrease in tip fee revenue:
    b. **Revenues**
        - Commodity sales revenue:
        - User fees:

- **Atmospheric GHG emission reduction** (metric tons or CO2):

- **Operational feasibility (identify 1) what ISWR can currently accommodate, and 2) any roadblocks)**:

- **Implementation strategy (Operational)**:

- **Community engagement strategy:**

- **Educational value to the community**:

- **Measure of Success:**

- **Time fame**:

Appendix G. Teton County Municipal Solid Waste Data

Year	Population	Solid Waste Generation (Tons)	Total Material Diverted from Landfill Through Recycling, Reuse, Composting (Tons)	Total Material to Landfill (Tons)	Percent Diversion from Landfill
1985	10127				
1990	11,173	18621.0	0.0	18621.0	0.0%
1991		19393.0	0.0	19393.0	0.0%
1992		20166.0	0.0	20166.0	0.0%
1993		21172.0	0.0	21172.0	0.0%
1994		23280.0	0.0	23280.0	0.0%
1995	14907	23668.0	0.0	23668.0	0.0%
1996		22821.0	1370.9	21450.1	6.0%
1997		24827.0	1770.3	23056.7	7.1%
1998		26539.0	2314.0	24225.0	8.7%
1999		28428.0	2393.8	26034.2	8.4%
2000	18251	33003.0	2496.9	30506.2	7.6%
2001		39909.6	8389.0	31520.6	21.0%
2002		37507.3	7251.9	30255.4	19.3%
2003		37527.5	6664.2	30863.3	17.8%
2004		40067.2	7604.9	32462.3	19.0%
2005		39372.0	8341.7	31030.3	21.2%
2006		42690.6	11549.1	31141.5	27.1%
2007		44542.4	14583.8	29958.6	32.7%
2008		44515.1	15632.0	28883.1	35.1%
2009		42493.4	15154.7	27338.7	35.7%
2010	21294	38635.9	15545.7	23090.2	40.2%
2011		35579.3	12550.9	23028.4	35.3%
2012		38181.9	15243.6	22938.3	39.9%
2013	22268	36003.4	12360.1	23643.3	34.3%
2014		38770.1	13229.8	25540.3	34.1%

*Although wood was separated from solid waste 1990-2000, it was burned rather than recycled/reused/composted and is, therefore, not counted as diverted material until 2001 when composting of wood waste began.

Individual Material Diversion in Tons per Year

Year	Aluminum Cans	Office Paper	Corrugated Cardboard	Glass (all colors)	Magazines	Newspapers	Telephone Directories	Steel Food Cans
1985								
1990								
1991								
1992								
1993								
1994								
1995								
1996	16.0	54.1	432.2	503.0	36.7	272.1	1.7	25.7
1997	37.0	117.4	607.4	531.8	52.8	356.6	2.0	45.5
1998	38.3	98.5	855.6	644.0	208.1	392.5	7.5	23.6
1999	22.2	94.0	920.5	608.1	214.3	426.3	7.0	57.5
2000	36.6	101.5	996.5	602.1	227.6	466.8	6.1	15.1
2001	15.9	116.5	1009.5	698.5	254.6	503.0	20.6	47.2
2002	16.3	125.0	1177.7	766.7	329.5	555.2	0.0	21.0
2003	21.0	168.7	1157.8	751.1	399.4	519.8	14.9	31.9
2004	36.3	174.0	1195.7	720.5	422.4	452.0	20.0	33.4
2005	25.5	170.5	1267.9	720.7	468.8	595.3	20.4	29.6
2006	20.4	218.9	1360.5	887.1	492.5	626.9	30.1	27.8
2007	41.5	189.5	1246.5	950.8	512.8	630.3	30.9	31.9
2008	20.5	201.3	1434.4	1168.1	485.3	701.9	32.9	54.8
2009	23.1	266.6	1447.2	1149.7	388.0	684.7	53.0	59.9
2010	43.4	221.2	1356.4	1022.2	434.1	593.8	43.1	65.1
2011	42.2	208.4	1371.9	1050.5	426.4	614.0	50.7	67.8
2012	41.2	241.2	1217.2	1180.0	392.9	583.1	21.0	56.2
2013	42.3	170.5	1299.8	971.1	400.6	490.2	20.7	32.2
2014	40.7	189.8	1389.5	995.5	372.9	488.9	42.3	65.0

Individual Material Diversion in Tons per Year Continued

Year	Plastic Bottles #2 HDPE	Plastic Bottles #1 PET	Plastic Bags	Tex-tiles	Haz. Waste	Elec. Waste	Clean Fill	Scrap Metal	Con-crete	Tires
1985										
1990										
1991										
1992										
1993										
1994										
1995										
1996	2.6	n/a						26.9		
1997	9.8	1.4						8.8		
1998	17.2	13.8						15.0		
1999	16.3	10.1						17.5		
2000	n/a	14.6						30.0		
2001	37.3	20.4	0.0	0.0	0.0	0.0	0.0	25.5	0.0	0.0
2002	31.5	29.9	0.0	0.0	7.1	6.0	0.0	30.0	0.0	0.0
2003	22.3	19.4	0.0	0.0	1.2	14.7	0.0	0.0	0.0	0.0
2004	25.6	31.9	0.0	0.0	17.3	24.8	0.0	1.0	0.0	0.0
2005	27.5	28.7	0.0	0.0	20.4	30.4	0.0	0.0	503.0	0.0
2006	28.2	46.8	0.0	0.0	19.7	43.5	326.1	1065.9	1527.4	9.1
2007	26.1	26.0	2.8	0.0	23.3	55.3	566.2	998.9	1050.7	24.6
2008	18.1	53.4	5.5	0.0	32.9	40.0	329.6	796.1	987.3	31.4
2009	61.4	58.3	5.8	0.0	28.9	55.5	454.2	1072.6	692.7	33.1
2010	34.6	92.8	3.9	0.0	27.0	39.1	2792.4	938.5	1081.1	25.0
2011	43.0	52.7	2.4	0.0	20.8	66.5	1284.1	718.8	727.1	31.0
2012	42.3	64.8	1.7	0.0	16.2	76.8	4062.0	548.0	601.7	36.6
2013	40.8	44.6	3.5	0.0	33.1	94.0	873.8	437.5	685.4	21.6
2014	40.7	41.9	5.8	66.1	24.3	102.6	276.4	550.8	761.5	19.7

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